

FORM 1 - IN  
INORGANIC ANALYSIS DATA SHEET

YE8C9

Lab Name: Alliance Technical Group, LLC Contract: 68HERH20D0011  
Lab Code: ACE Case No.: 51955 MA No. :                      SDG No.: YE8C9  
Matrix: SOIL Lab Sample ID: Q1159-01  
% Solids: 86.4 Date Received: 01/22/2025  
Analytical Method: ICP\_AES  
Concentration Units ( $\mu\text{g/L}$ ,  $\text{mg/L}$ ,  $\text{mg/kg}$  dry weight,  $\mu\text{g}$ , or  $\mu\text{g/cm}^2$ ): mg/kg

| CAS No.   | Analyte   | Concentration | Q | Date Analyzed | Time Analyzed |
|-----------|-----------|---------------|---|---------------|---------------|
| 7429-90-5 | Aluminum  | 7800          |   | 01/29/2025    | 1621          |
| 7440-70-2 | Calcium   | 2400          |   | 01/29/2025    | 1621          |
| 7439-89-6 | Iron      | 19000         |   | 01/29/2025    | 1621          |
| 7439-95-4 | Magnesium | 4100          |   | 01/29/2025    | 1621          |
| 7440-09-7 | Potassium | 110           | J | 01/29/2025    | 1621          |
| 7440-23-5 | Sodium    | 540           | U | 01/29/2025    | 1621          |

NOTE: Hardness (total) is reported in  $\text{mg/L}$

Comments:

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FORM 1 - IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

YE8D1

Lab Name: Alliance Technical Group, LLC Contract: 68HERH20D0011  
Lab Code: ACE Case No.: 51955 MA No. :                      SDG No.: YE8C9  
Matrix: SOIL Lab Sample ID: Q1159-04  
% Solids: 93.3 Date Received: 01/23/2025  
Analytical Method: ICP\_AES  
Concentration Units (µg/L, mg/L, mg/kg dry weight, µg, or µg/cm²): mg/kg

| CAS No.   | Analyte   | Concentration | Q | Date Analyzed | Time Analyzed |
|-----------|-----------|---------------|---|---------------|---------------|
| 7429-90-5 | Aluminum  | 12000         |   | 01/29/2025    | 1642          |
| 7440-70-2 | Calcium   | 2200          |   | 01/29/2025    | 1642          |
| 7439-89-6 | Iron      | 28000         |   | 01/29/2025    | 1642          |
| 7439-95-4 | Magnesium | 6700          |   | 01/29/2025    | 1642          |
| 7440-09-7 | Potassium | 350           | J | 01/29/2025    | 1642          |
| 7440-23-5 | Sodium    | 480           | U | 01/29/2025    | 1642          |

NOTE: Hardness (total) is reported in mg/L

Comments:

FORM 1 - IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

YE8D3

Lab Name: Alliance Technical Group, LLC Contract: 68HERH20D0011  
Lab Code: ACE Case No.: 51955 MA No. :                      SDG No.: YE8C9  
Matrix: SOIL Lab Sample ID: Q1159-05  
% Solids: 91.9 Date Received: 01/23/2025  
Analytical Method: ICP\_AES  
Concentration Units (µg/L, mg/L, mg/kg dry weight, µg, or µg/cm²): mg/kg

| CAS No.   | Analyte   | Concentration | Q | Date Analyzed | Time Analyzed |
|-----------|-----------|---------------|---|---------------|---------------|
| 7429-90-5 | Aluminum  | 1600          |   | 01/29/2025    | 1646          |
| 7440-70-2 | Calcium   | 27000         |   | 01/29/2025    | 1646          |
| 7439-89-6 | Iron      | 30000         |   | 01/29/2025    | 1646          |
| 7439-95-4 | Magnesium | 7800          |   | 01/29/2025    | 1646          |
| 7440-09-7 | Potassium | 540           |   | 01/29/2025    | 1646          |
| 7440-23-5 | Sodium    | 450           | U | 01/29/2025    | 1646          |

NOTE: Hardness (total) is reported in mg/L

Comments:

FORM 1 - IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

YE8E2

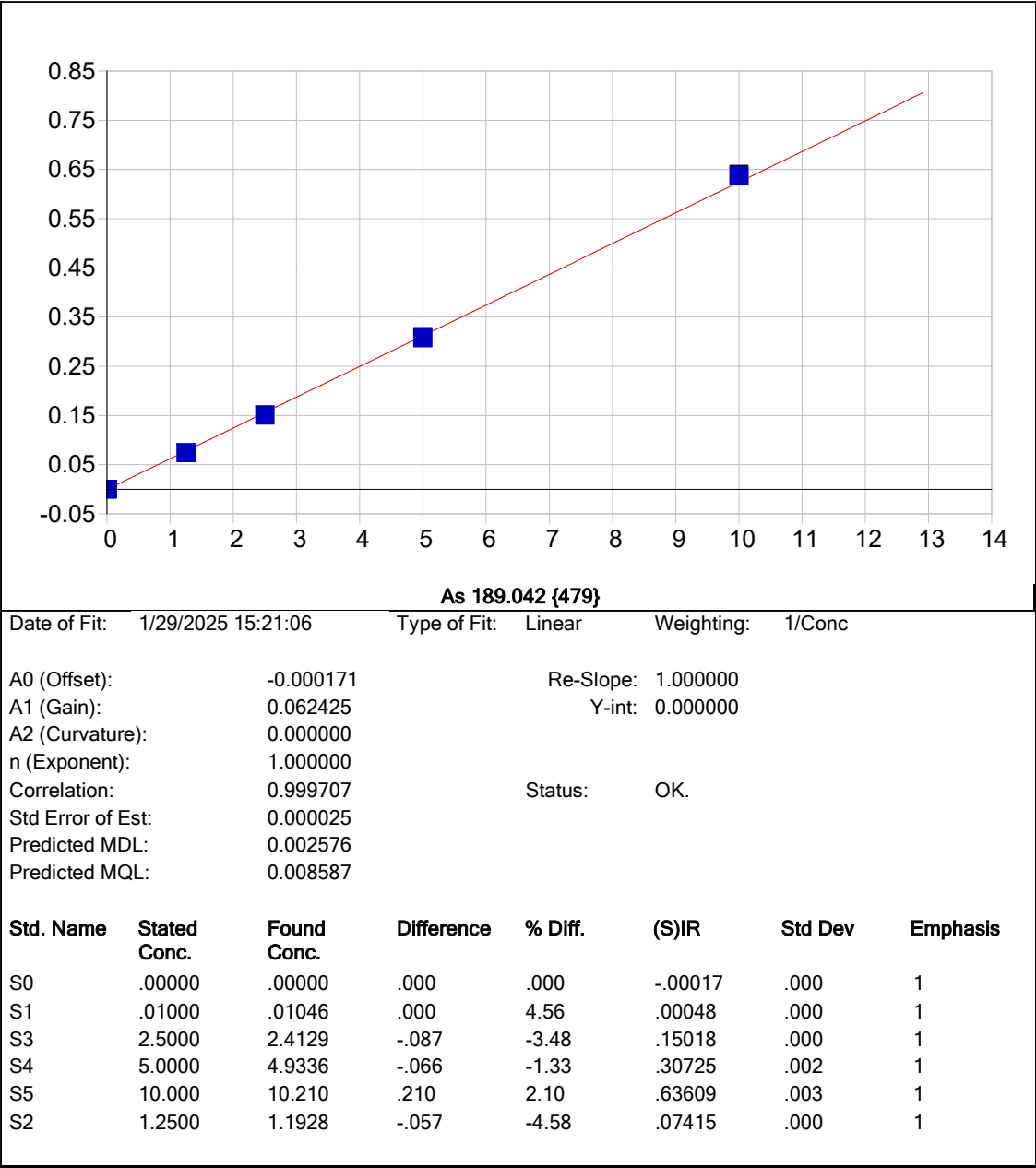
Lab Name: Alliance Technical Group, LLC Contract: 68HERH20D0011  
Lab Code: ACE Case No.: 51955 MA No. :                      SDG No.: YE8C9  
Matrix: SOIL Lab Sample ID: Q1159-06  
% Solids: 93.1 Date Received: 01/23/2025  
Analytical Method: ICP\_AES  
Concentration Units (µg/L, mg/L, mg/kg dry weight, µg, or µg/cm²): mg/kg

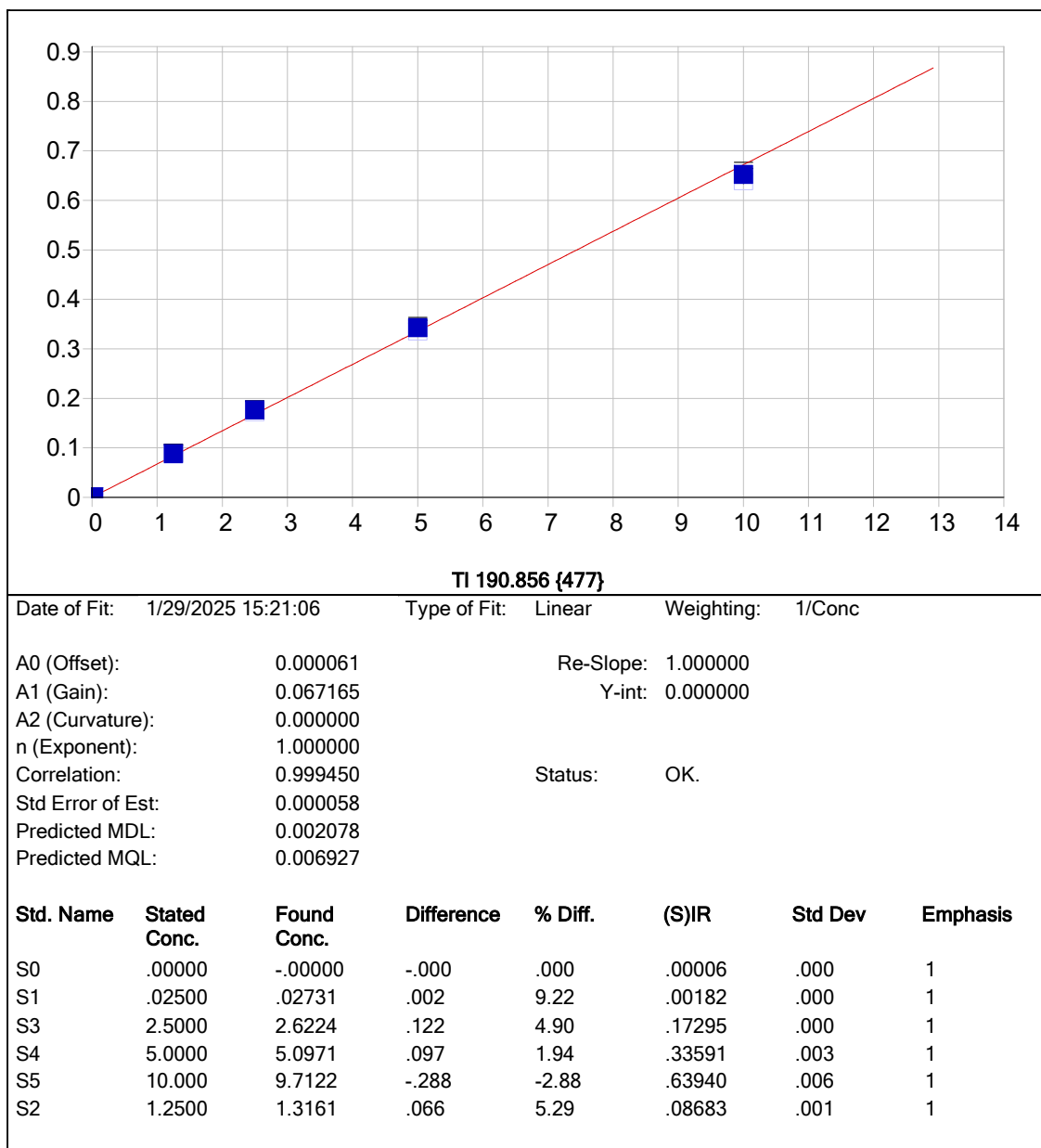
| CAS No.   | Analyte   | Concentration | Q | Date Analyzed | Time Analyzed |
|-----------|-----------|---------------|---|---------------|---------------|
| 7429-90-5 | Aluminum  | 5400          |   | 01/29/2025    | 1650          |
| 7440-70-2 | Calcium   | 890           |   | 01/29/2025    | 1650          |
| 7439-89-6 | Iron      | 11000         |   | 01/29/2025    | 1650          |
| 7439-95-4 | Magnesium | 4100          |   | 01/29/2025    | 1650          |
| 7440-09-7 | Potassium | 310           | J | 01/29/2025    | 1650          |
| 7440-23-5 | Sodium    | 390           | U | 01/29/2025    | 1650          |

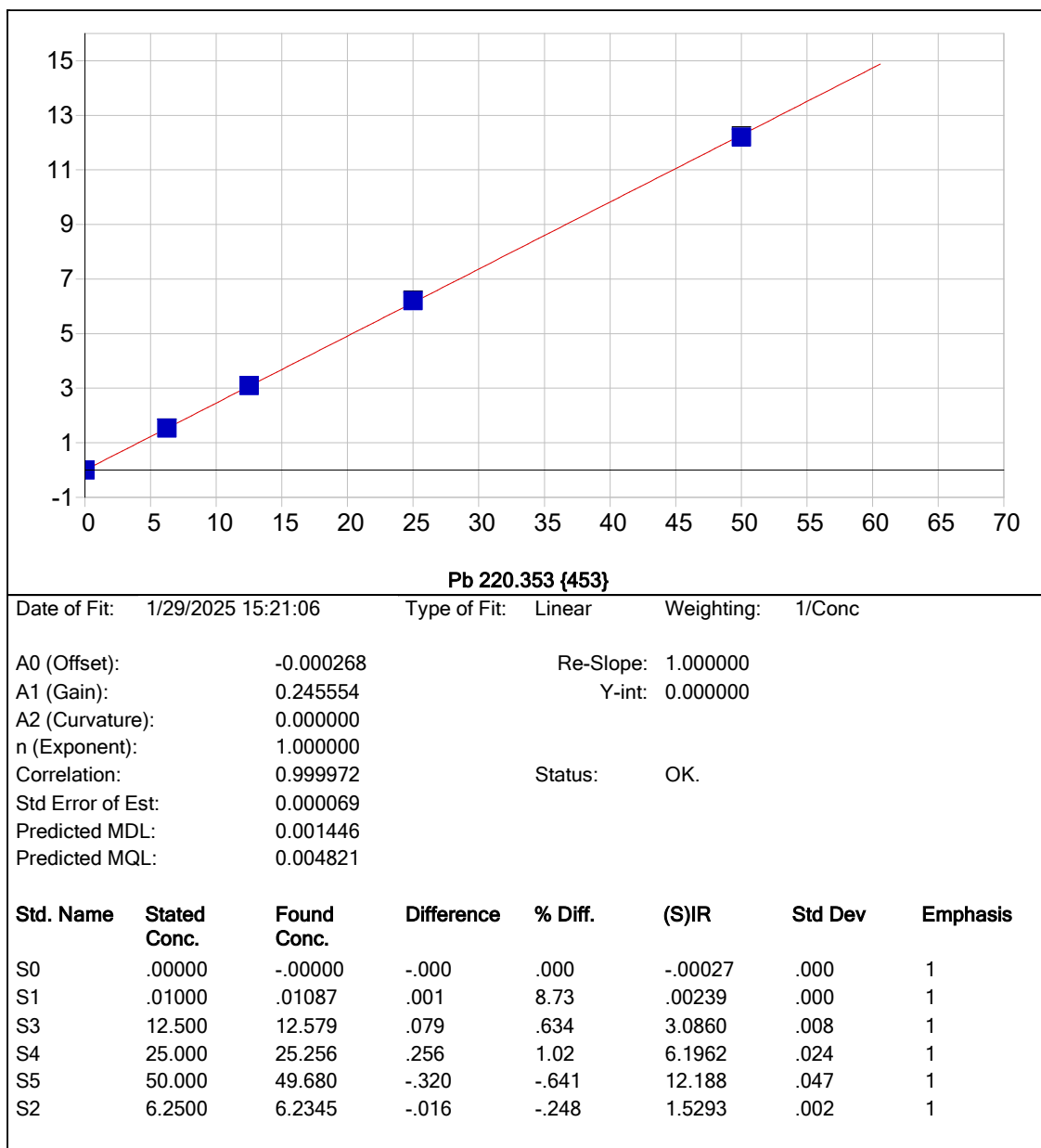
NOTE: Hardness (total) is reported in mg/L

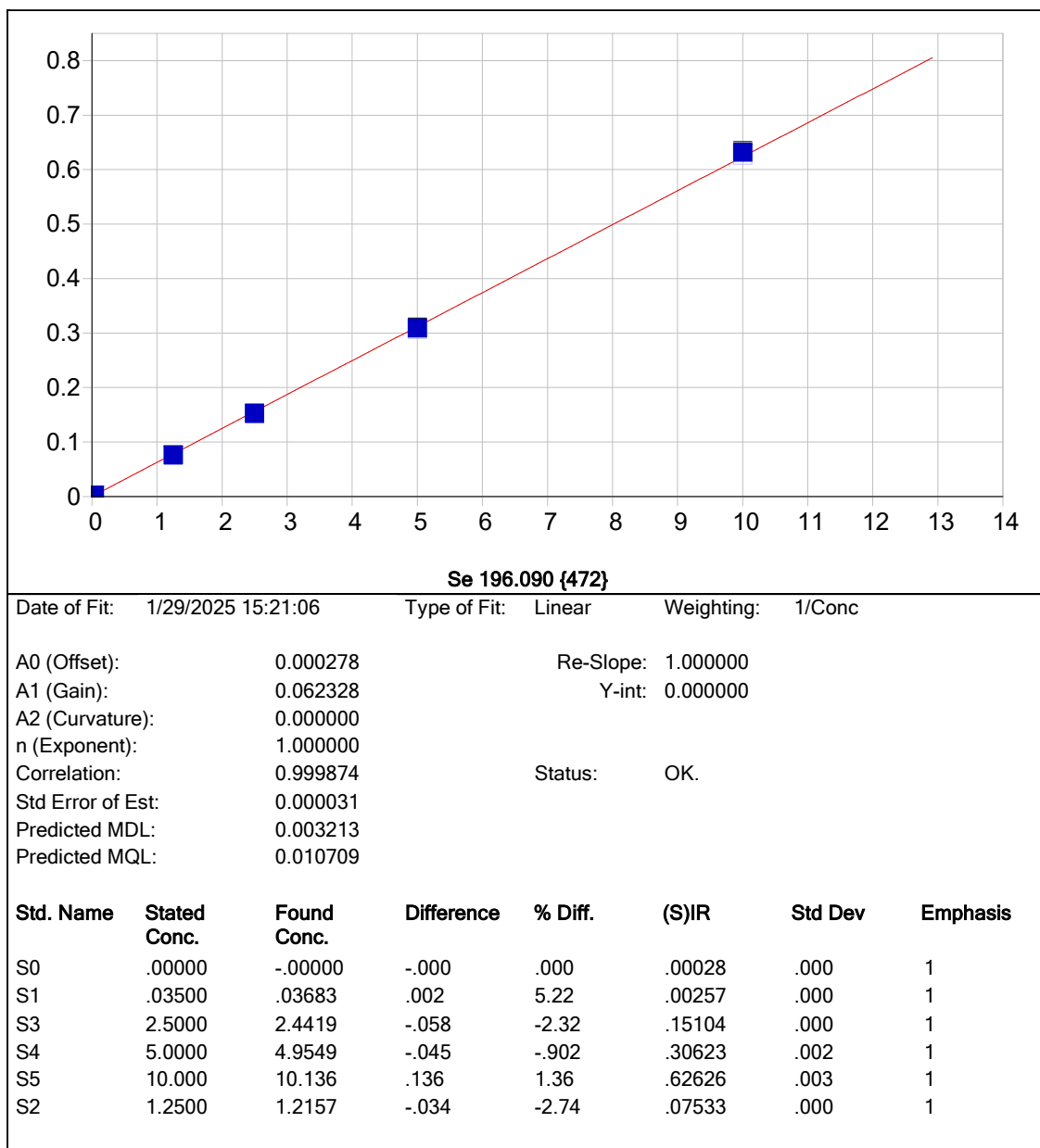
Comments:

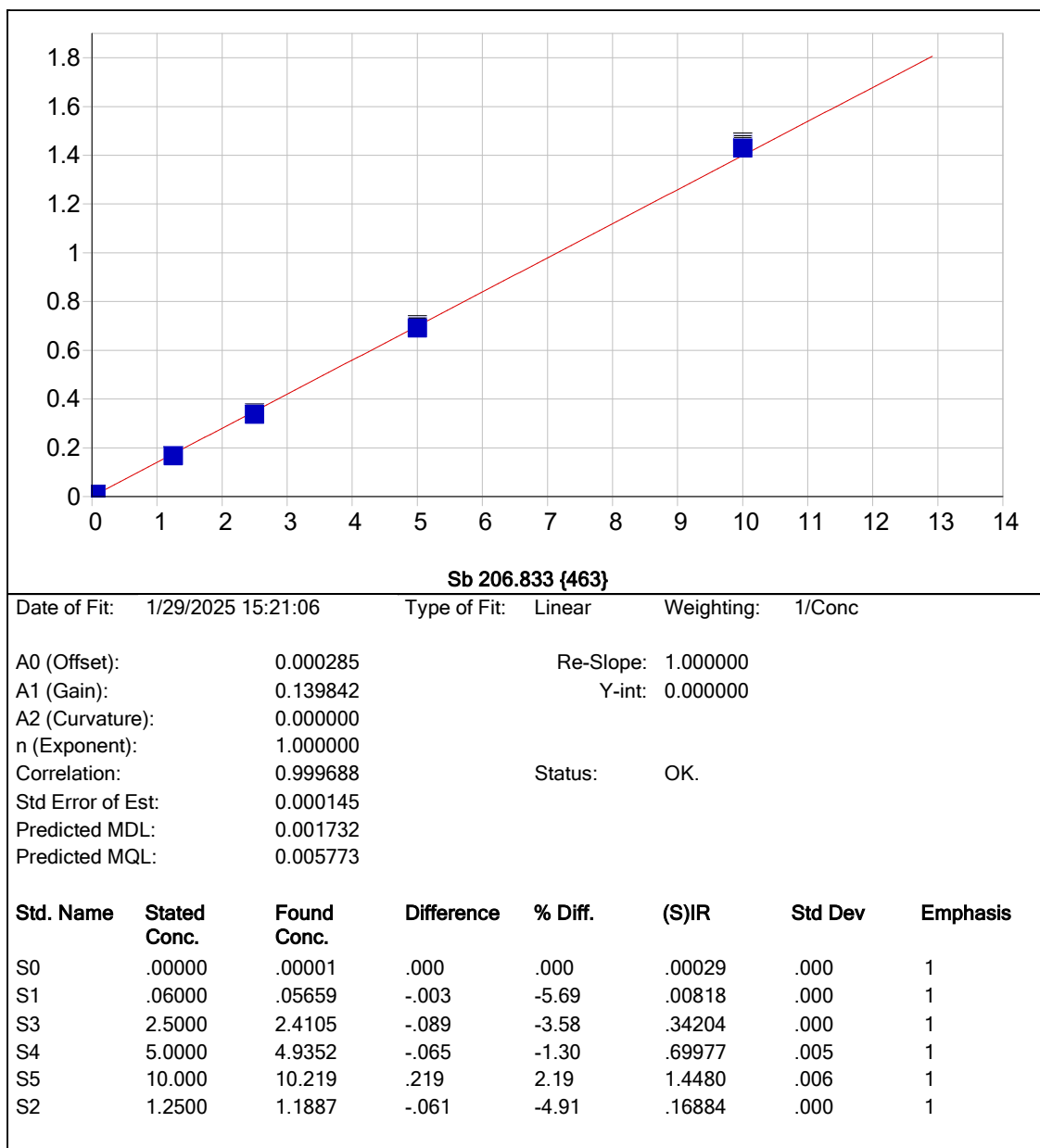


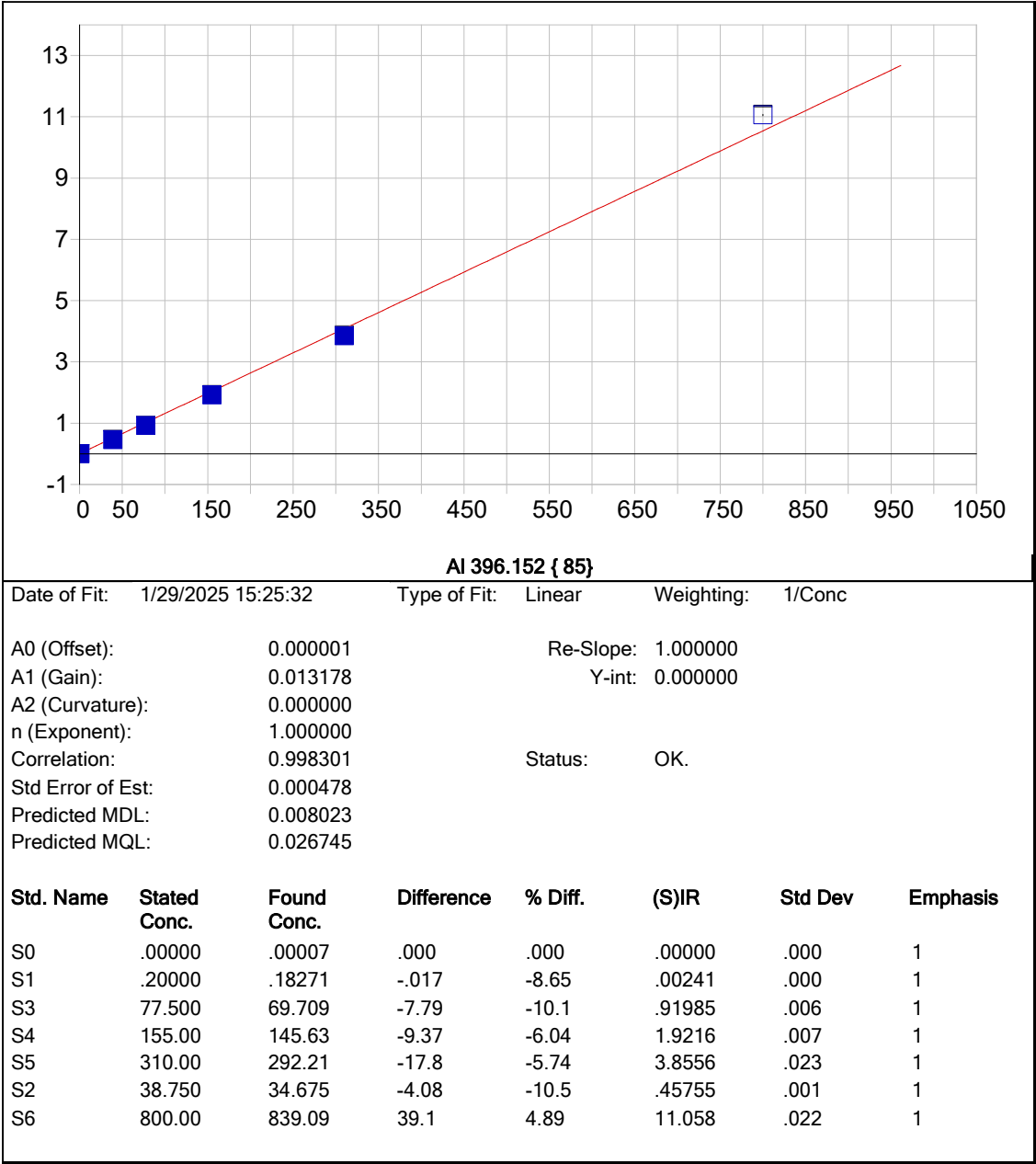


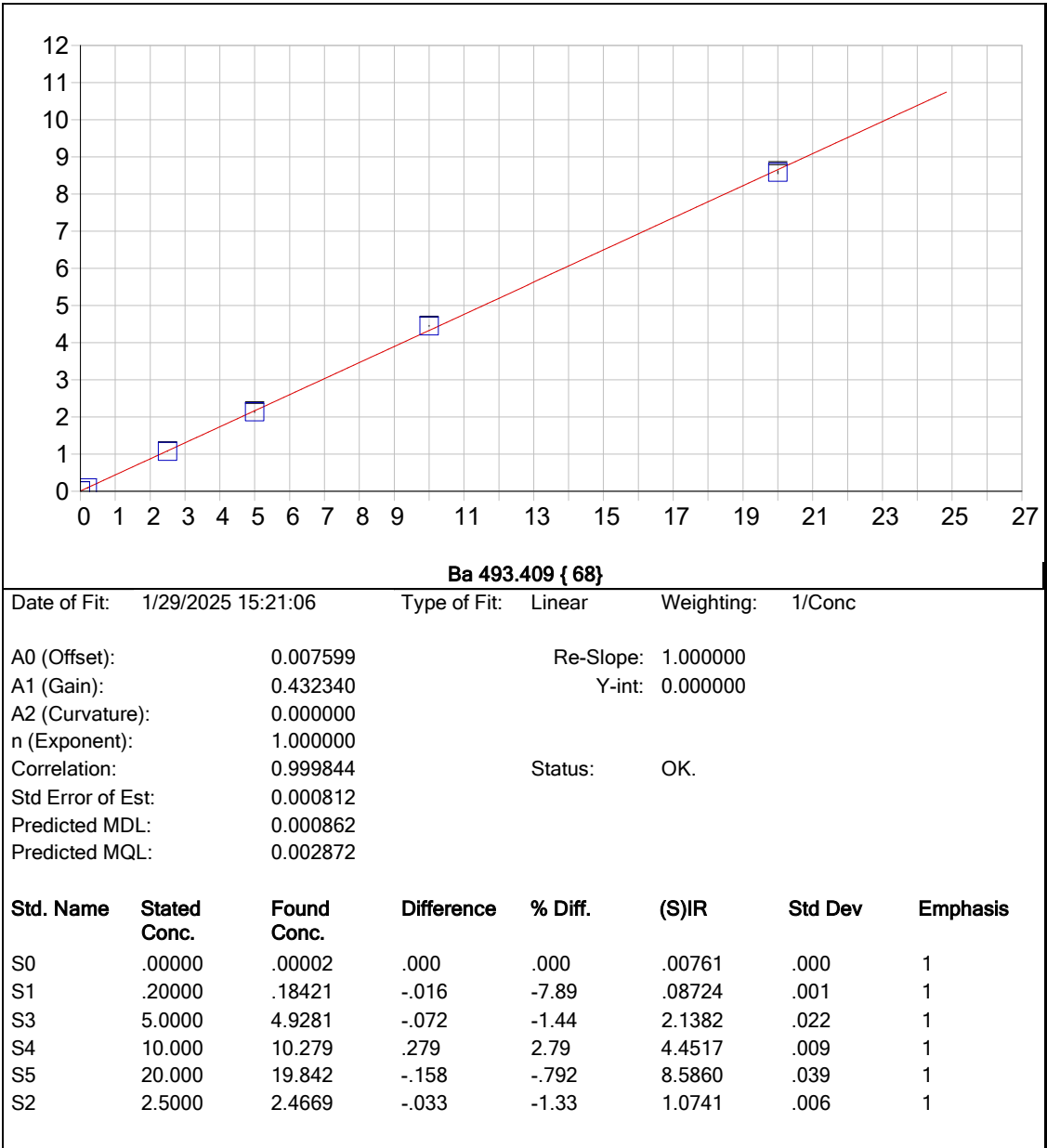


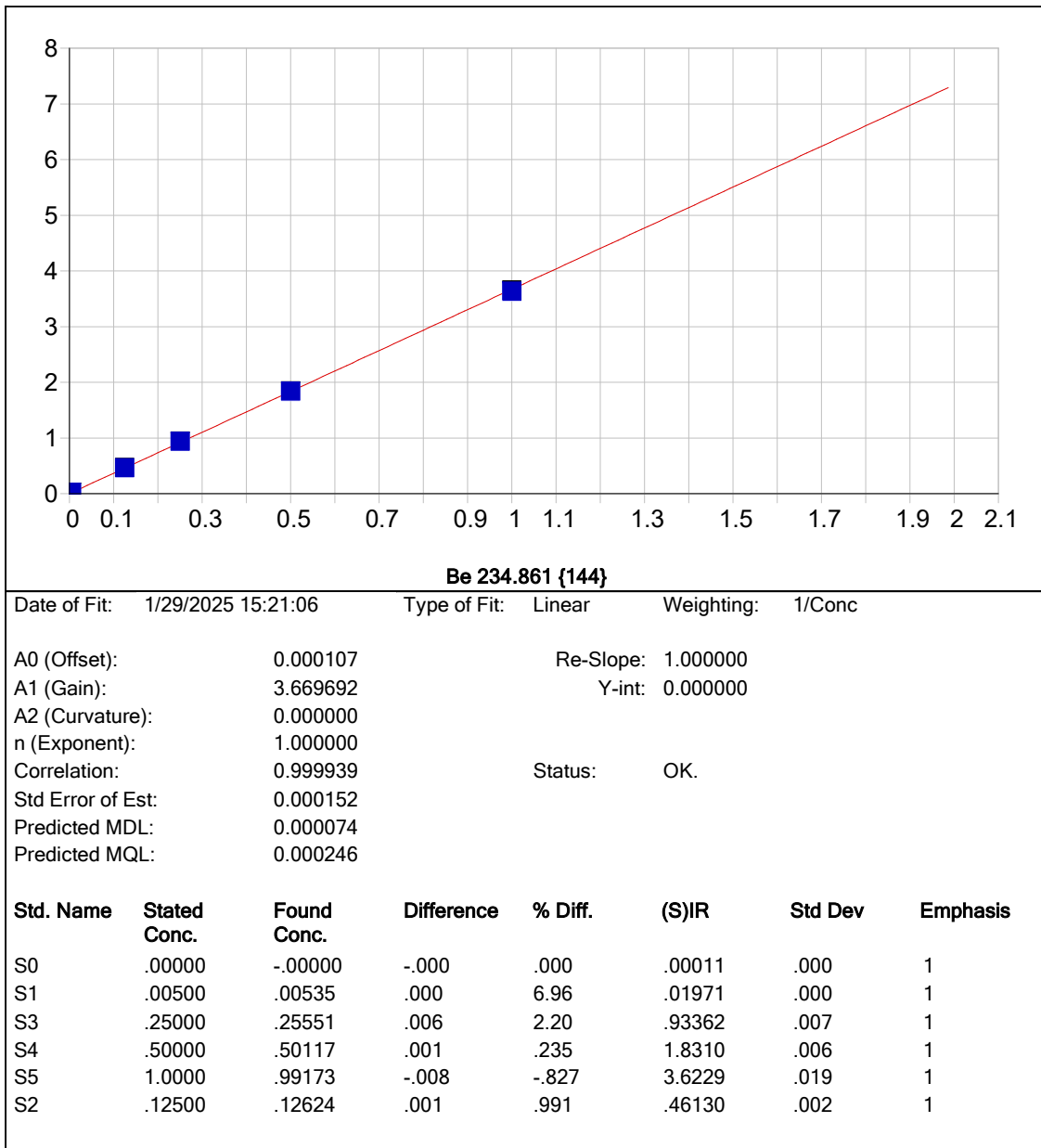




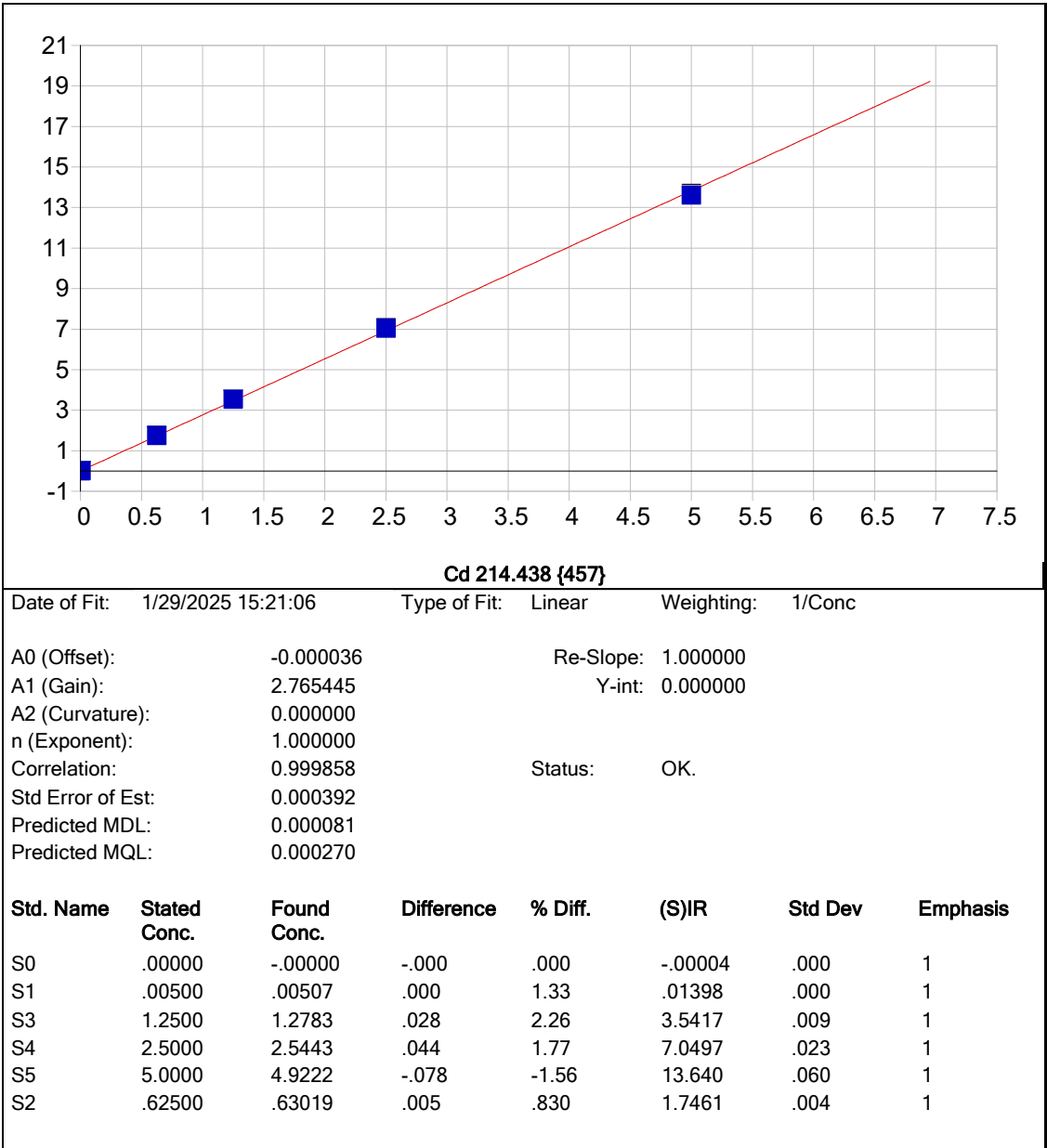


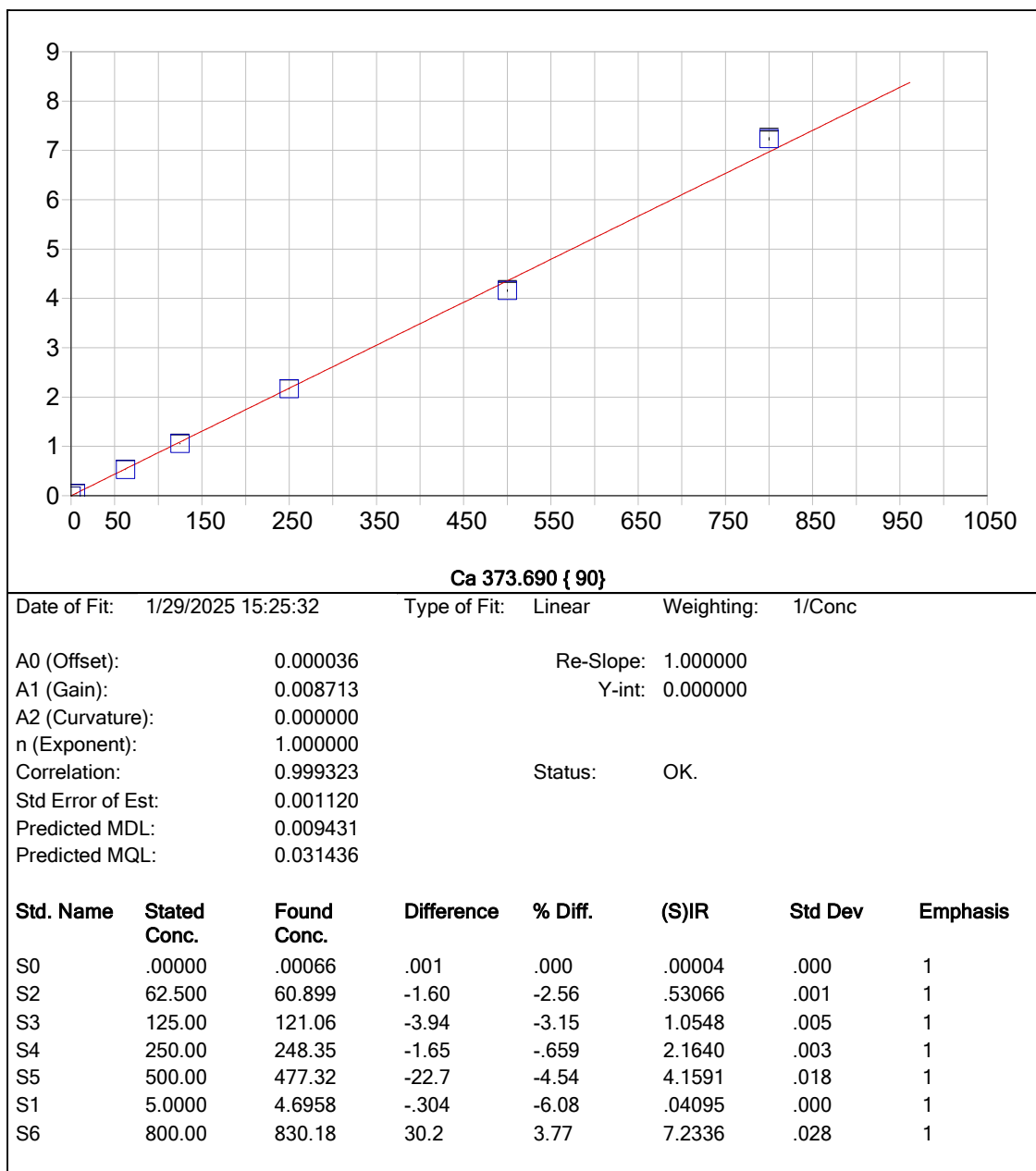


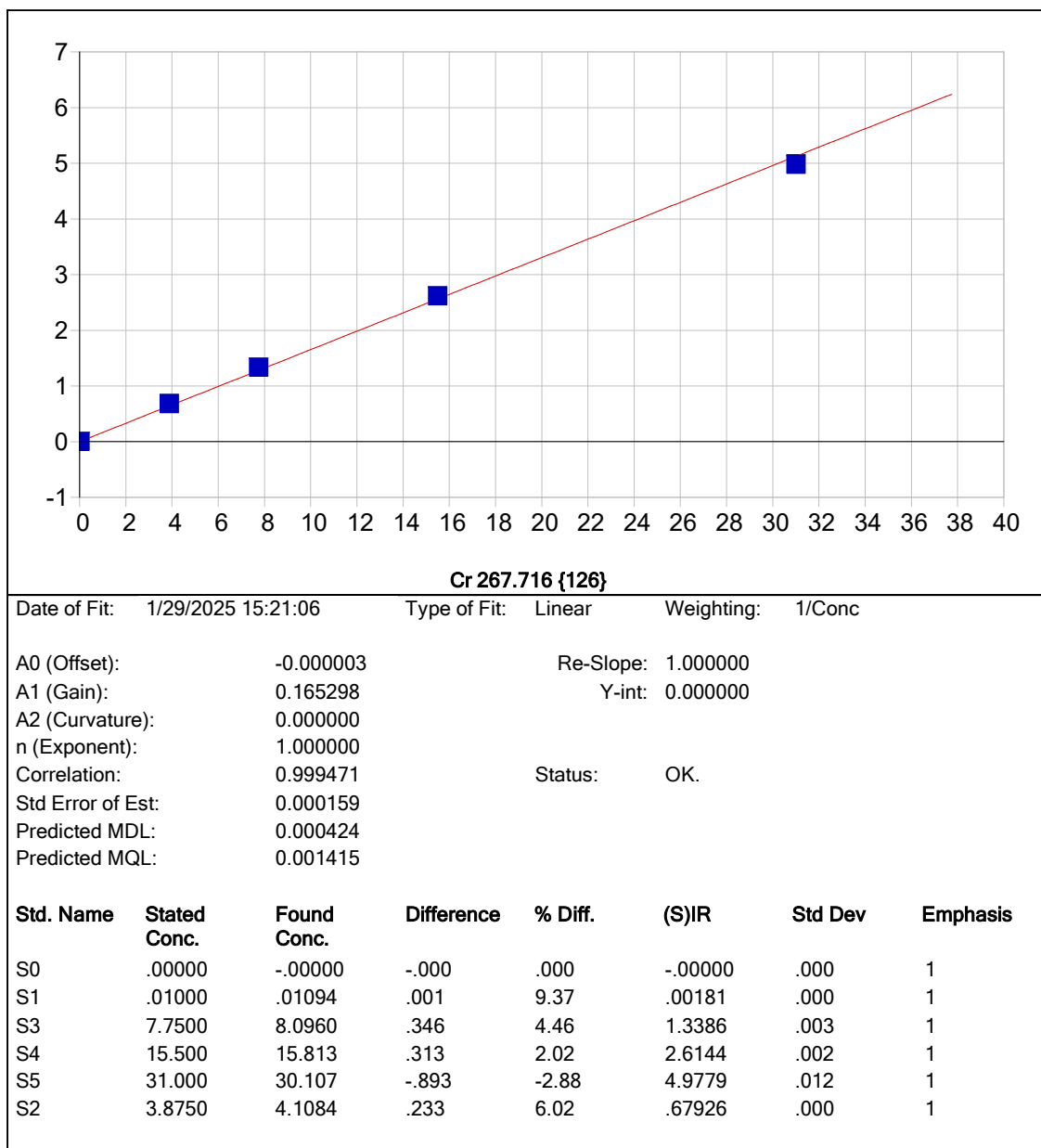


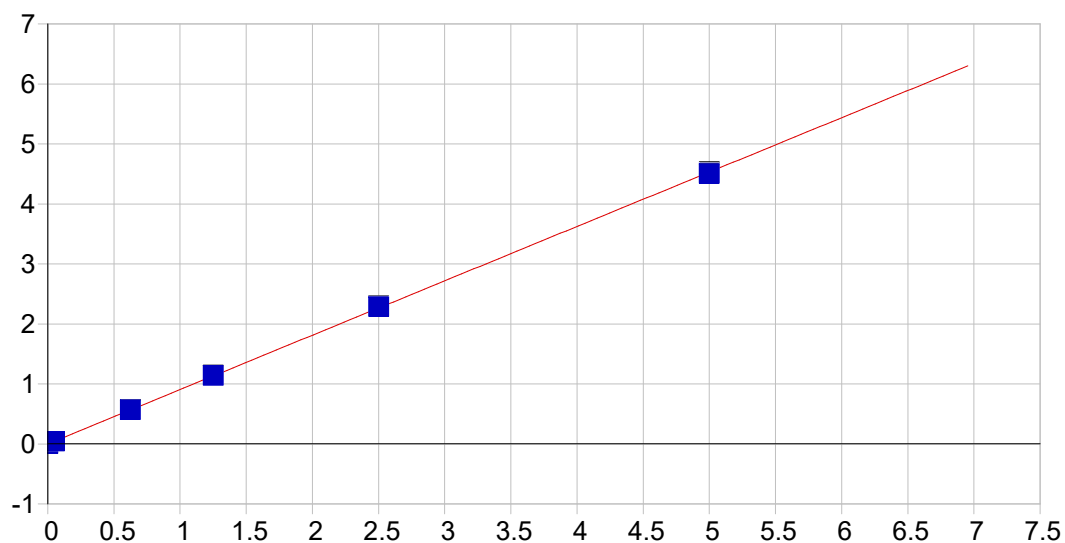










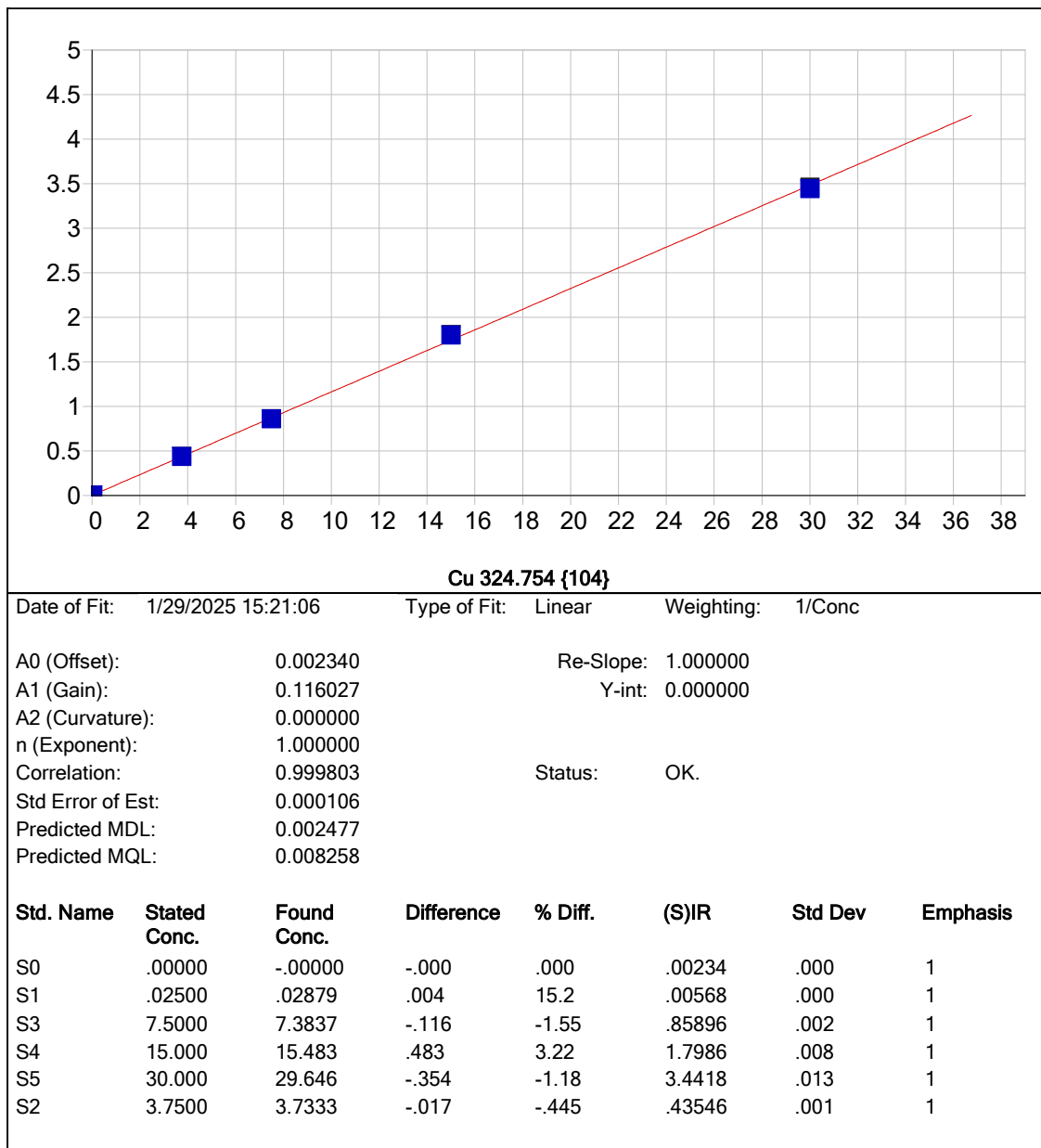


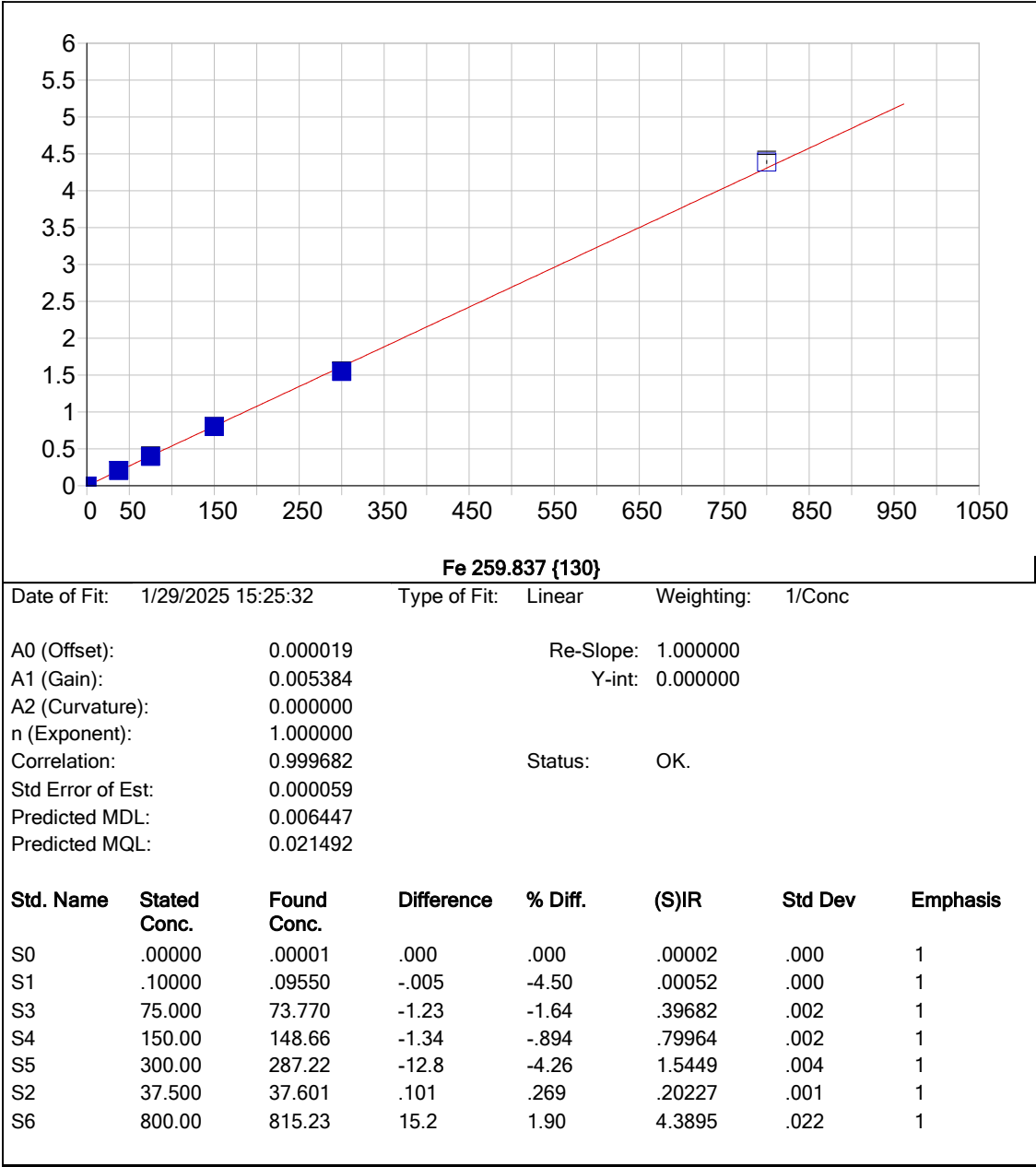
Co 228.616 {448}

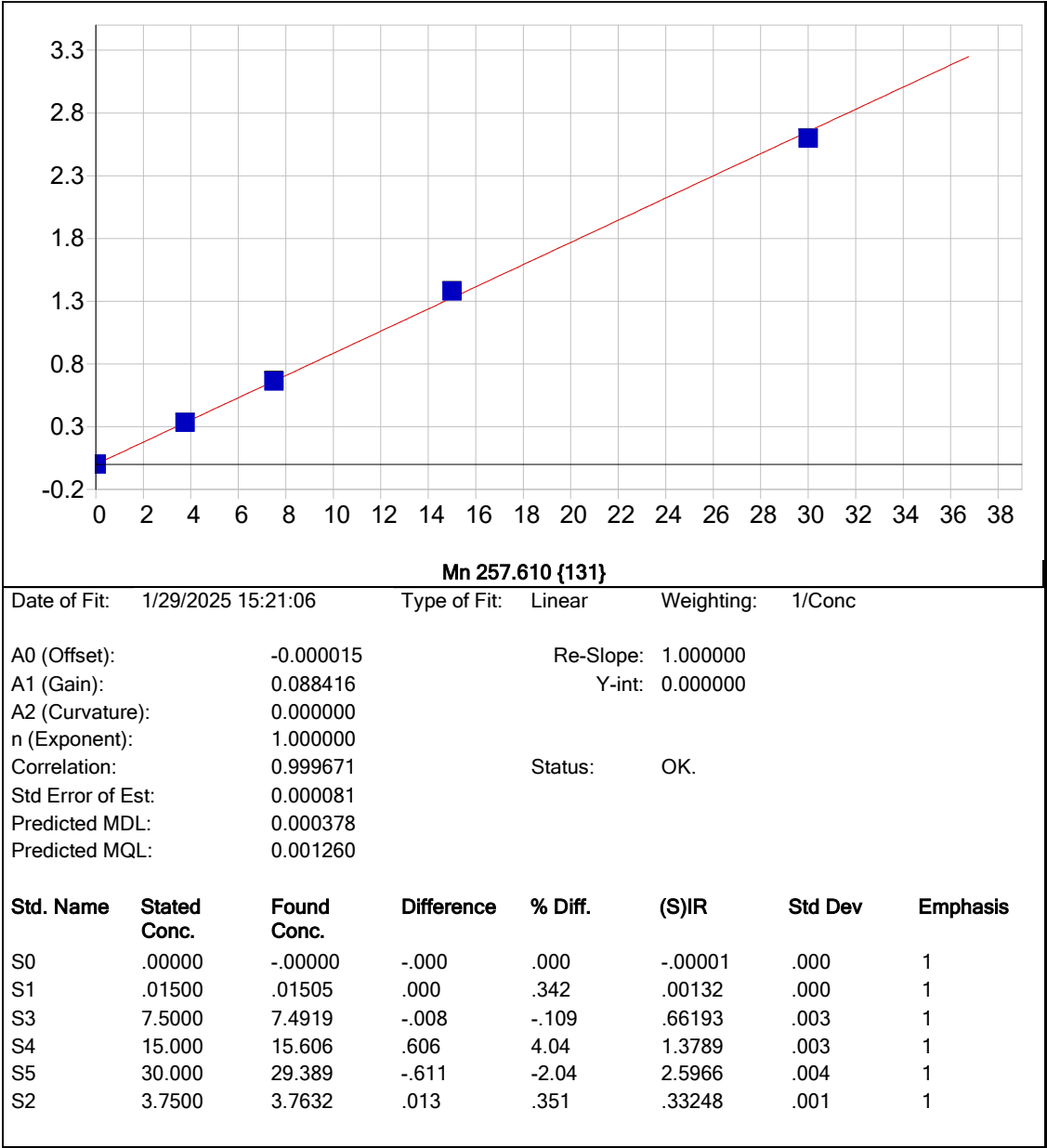
Date of Fit: 1/29/2025 15:21:06 Type of Fit: Linear Weighting: 1/Conc

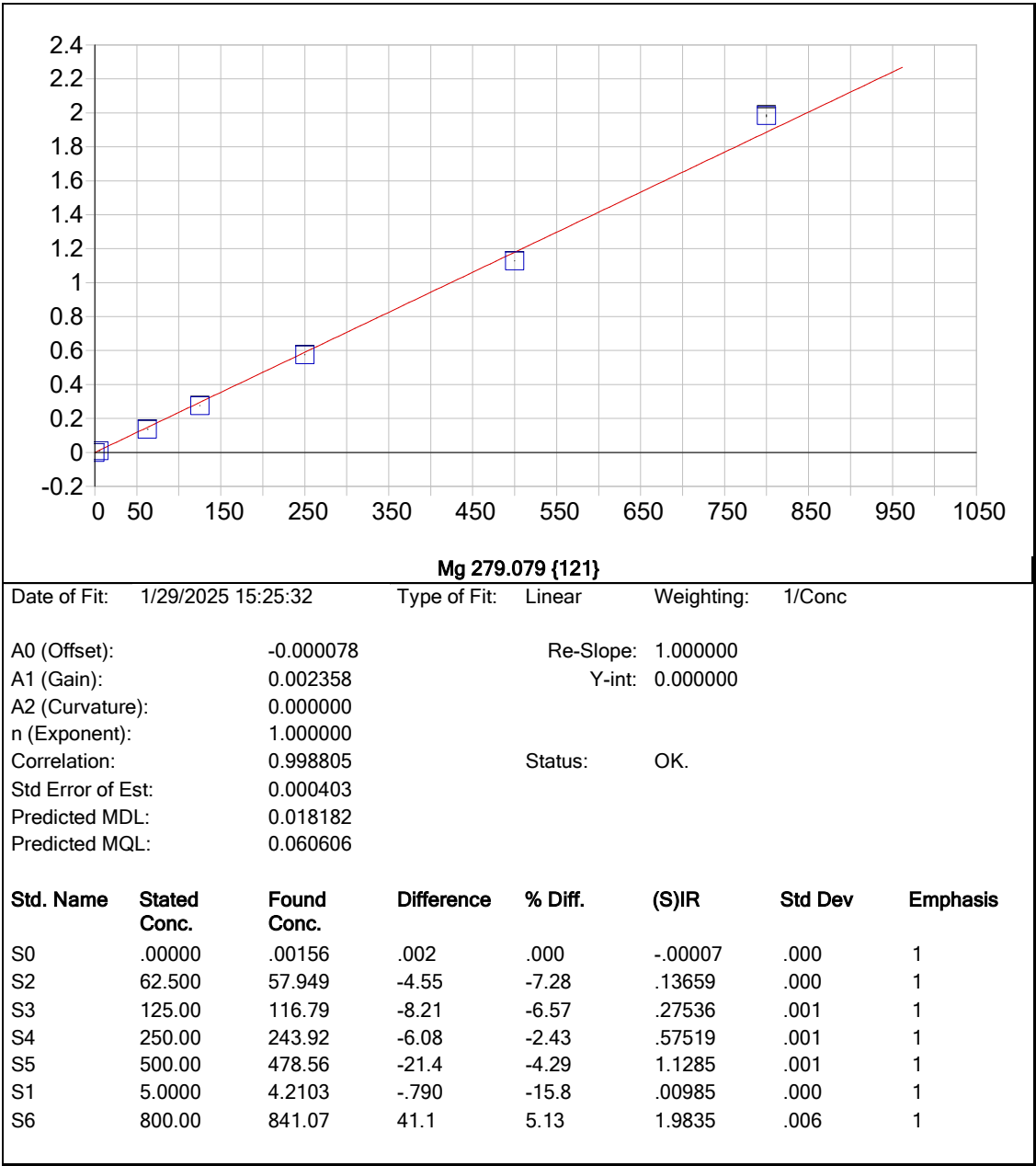
A0 (Offset): 0.000044 Re-Slope: 1.000000  
A1 (Gain): 0.906070 Y-int: 0.000000  
A2 (Curvature): 0.000000  
n (Exponent): 1.000000  
Correlation: 0.999978 Status: OK.  
Std Error of Est: 0.000161  
Predicted MDL: 0.000271  
Predicted MQL: 0.000904

| Std. Name | Stated Conc. | Found Conc. | Difference | % Diff. | (S)IR  | Std Dev | Emphasis |
|-----------|--------------|-------------|------------|---------|--------|---------|----------|
| S0        | .00000       | -.00000     | -.000      | .000    | .00004 | .000    | 1        |
| S1        | .05000       | .04963      | -.000      | -.734   | .04519 | .000    | 1        |
| S3        | 1.2500       | 1.2573      | .007       | .586    | 1.1436 | .002    | 1        |
| S4        | 2.5000       | 2.5224      | .022       | .896    | 2.2941 | .008    | 1        |
| S5        | 5.0000       | 4.9706      | -.029      | -.588   | 4.5210 | .016    | 1        |
| S2        | .62500       | .62503      | .000       | .005    | .56852 | .001    | 1        |

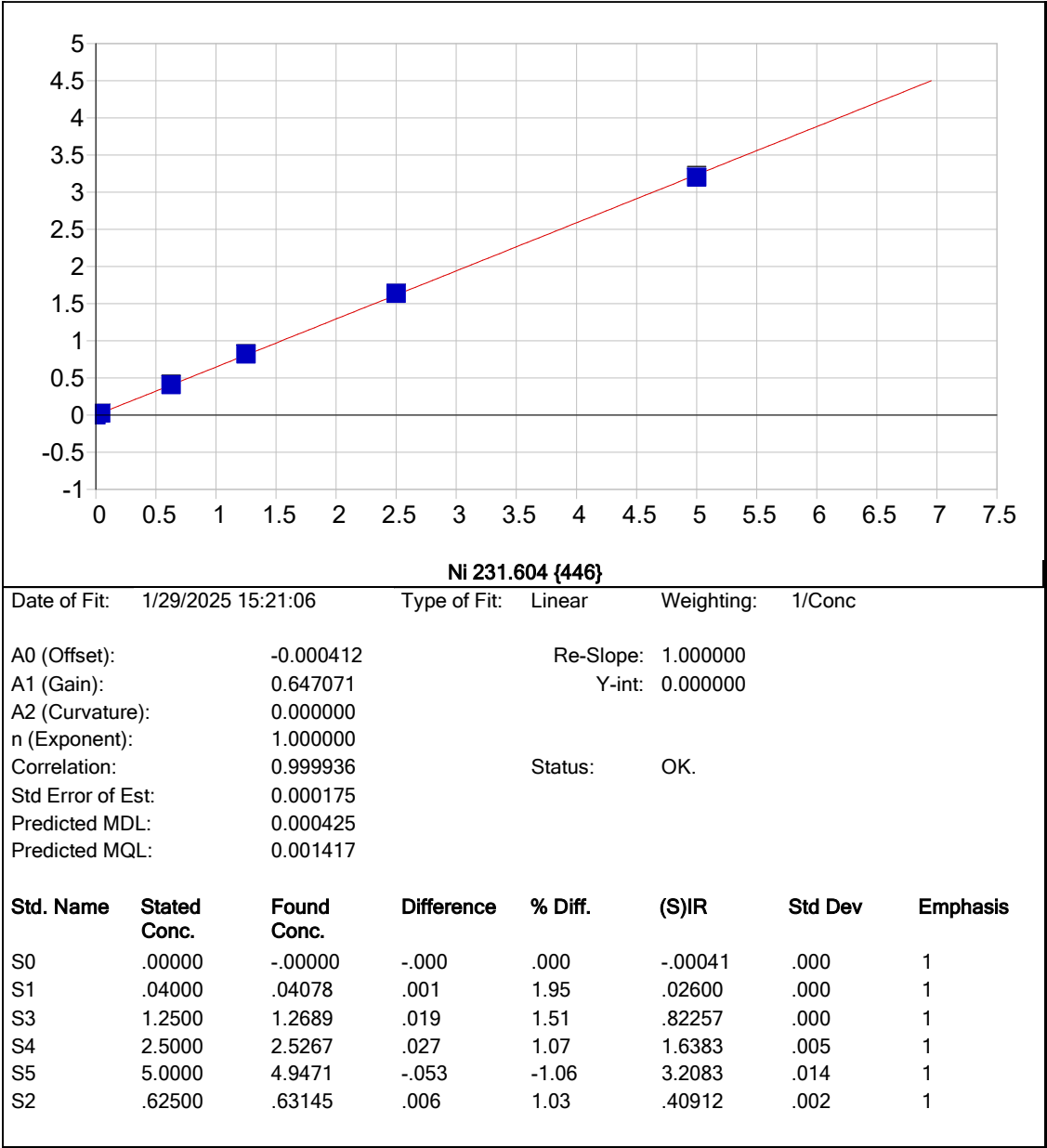


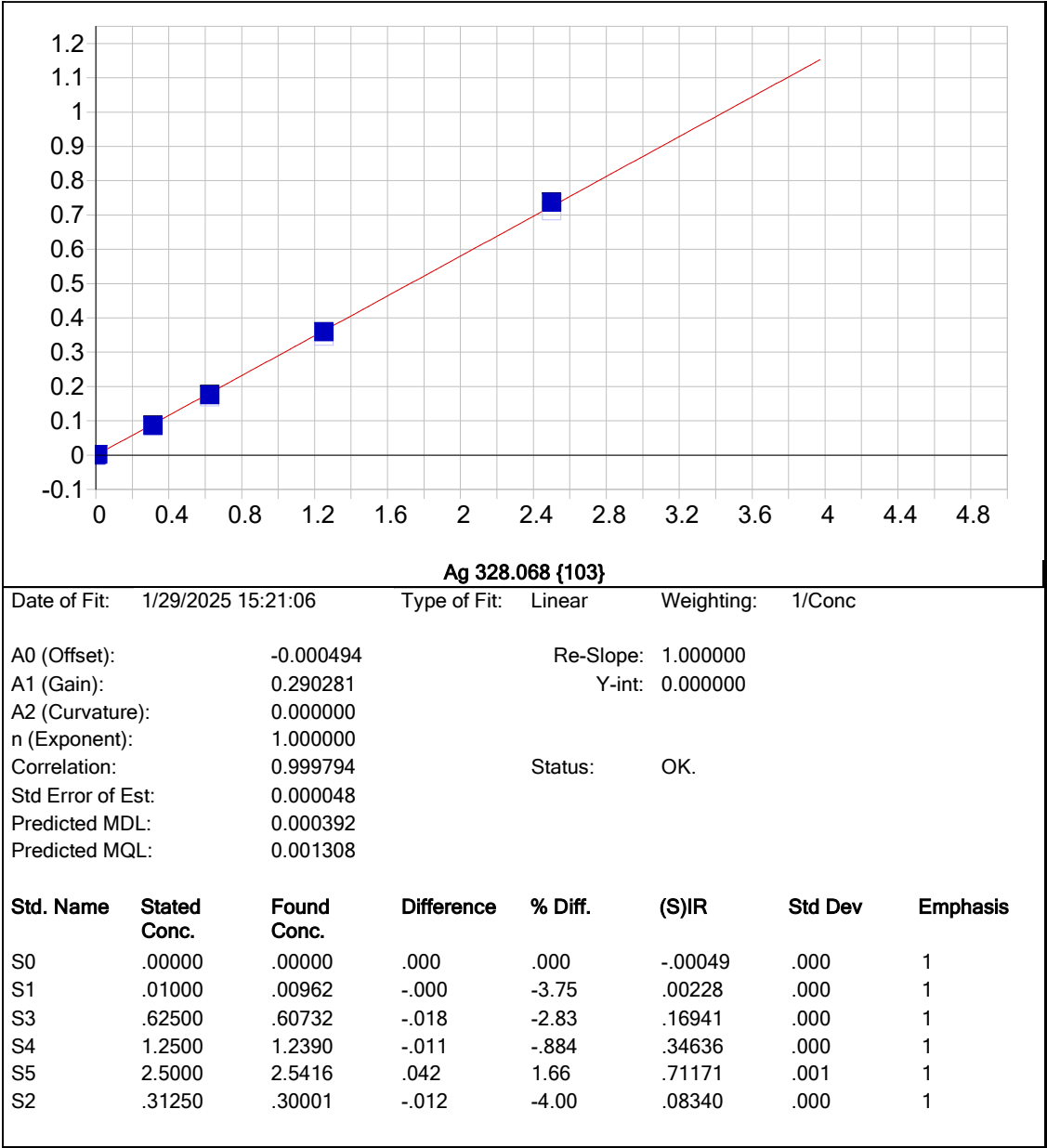


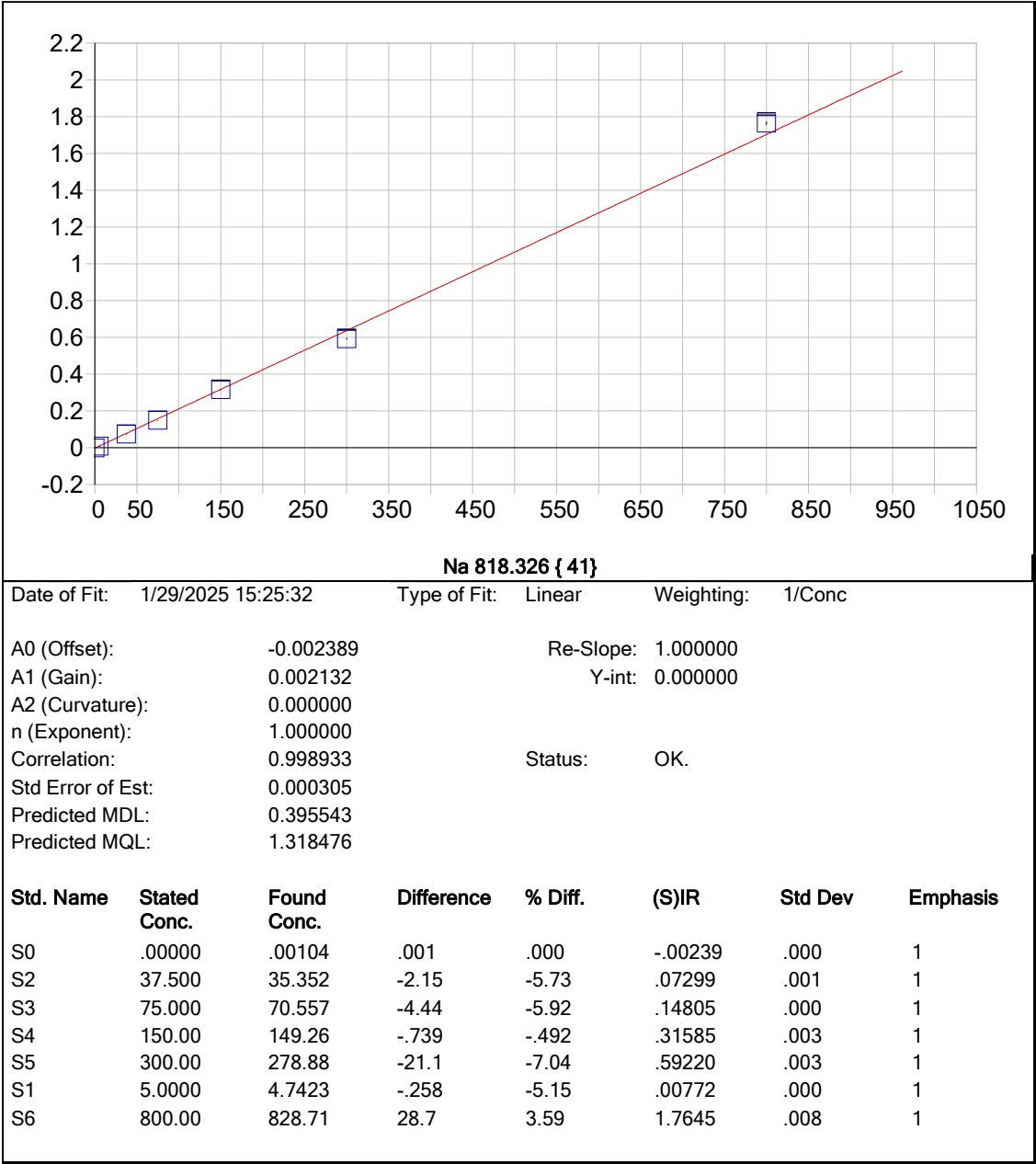


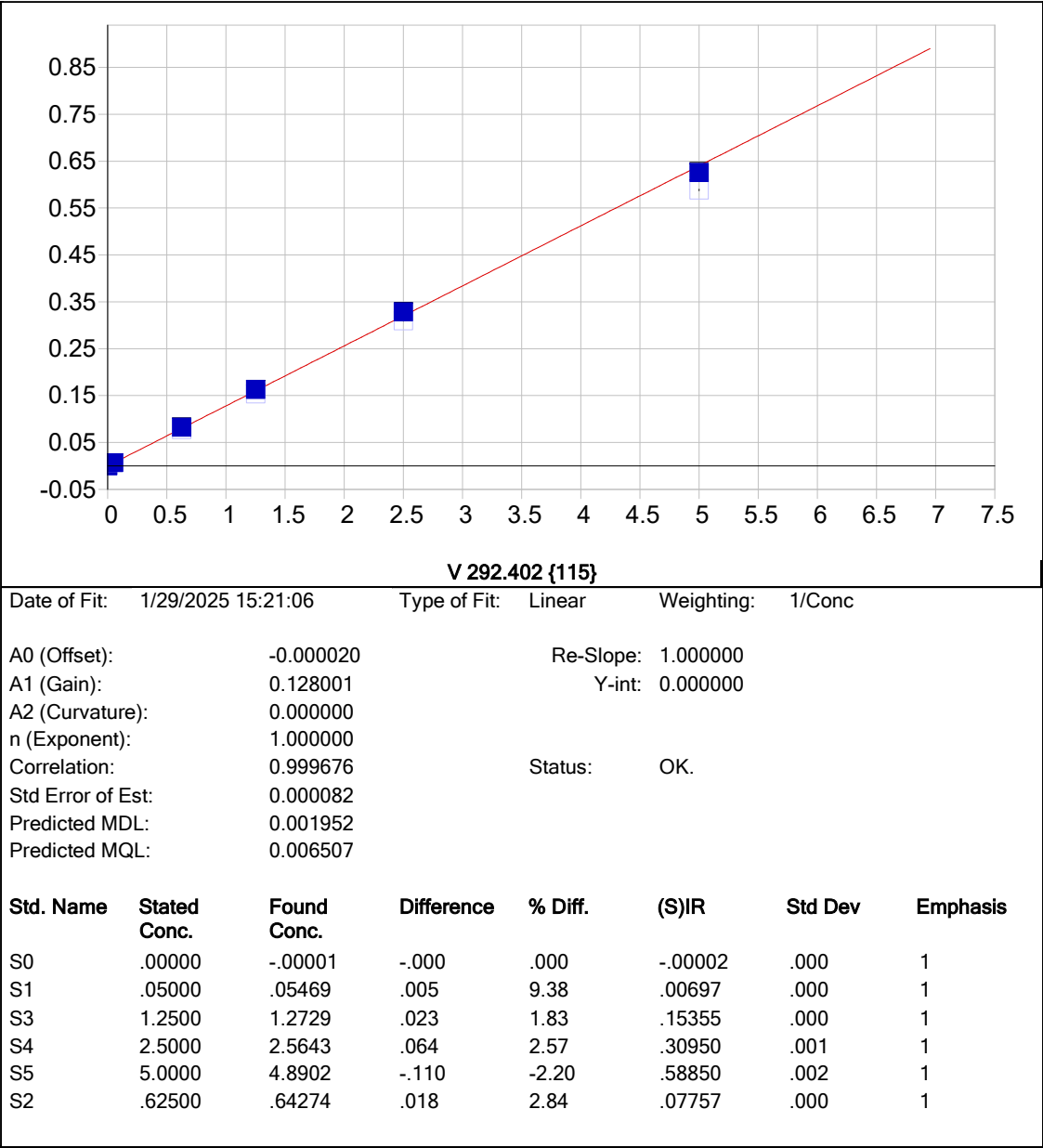


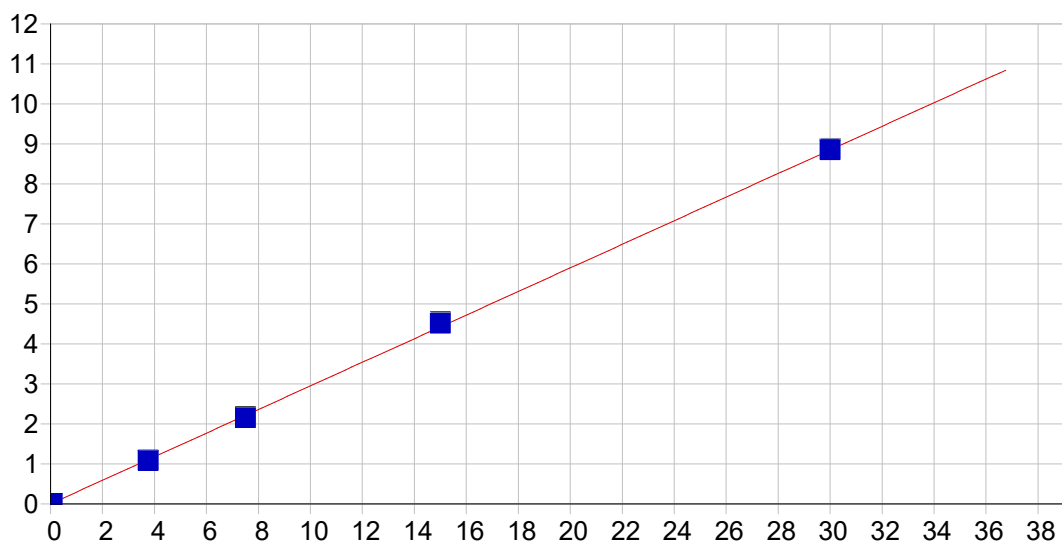










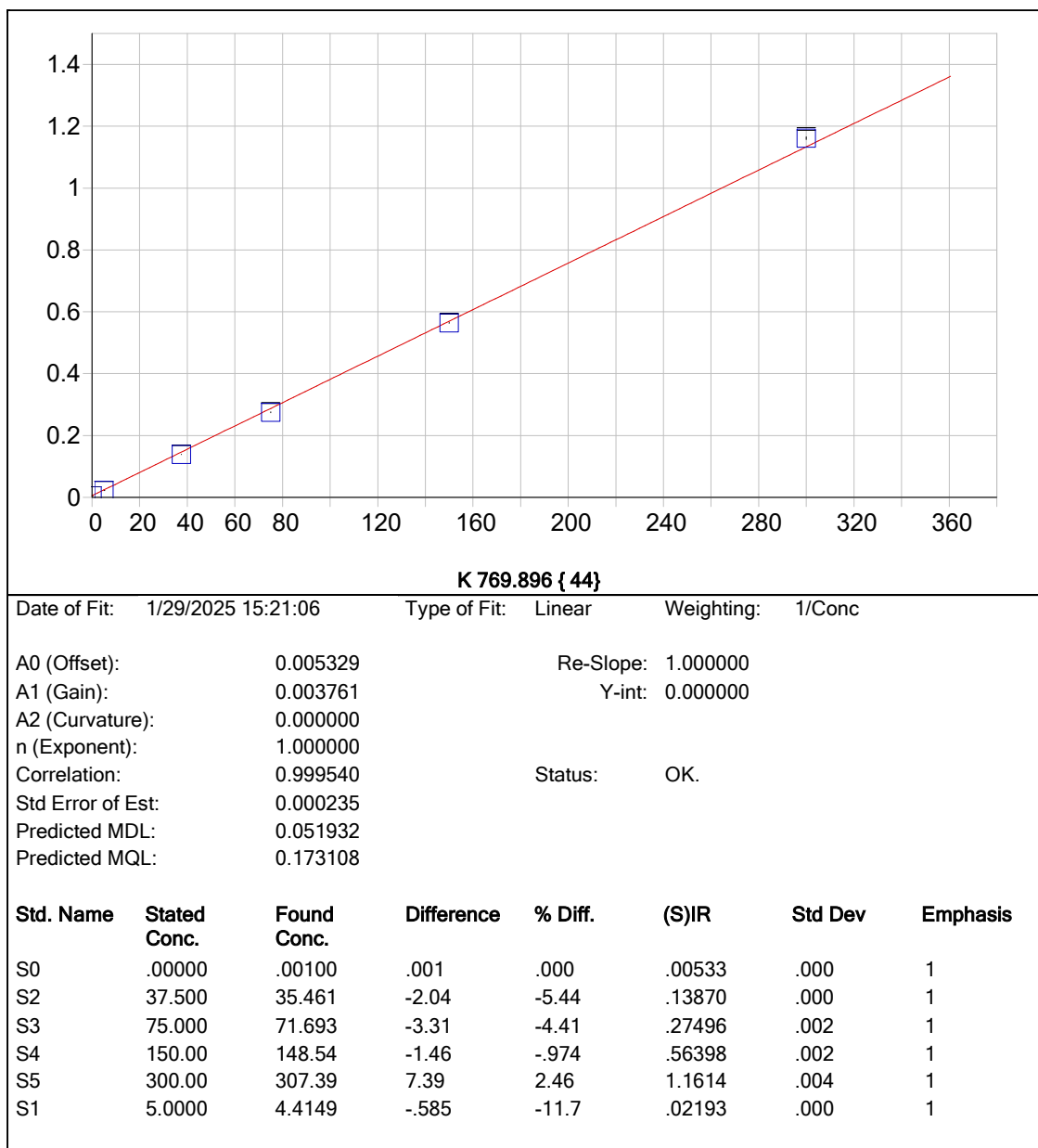


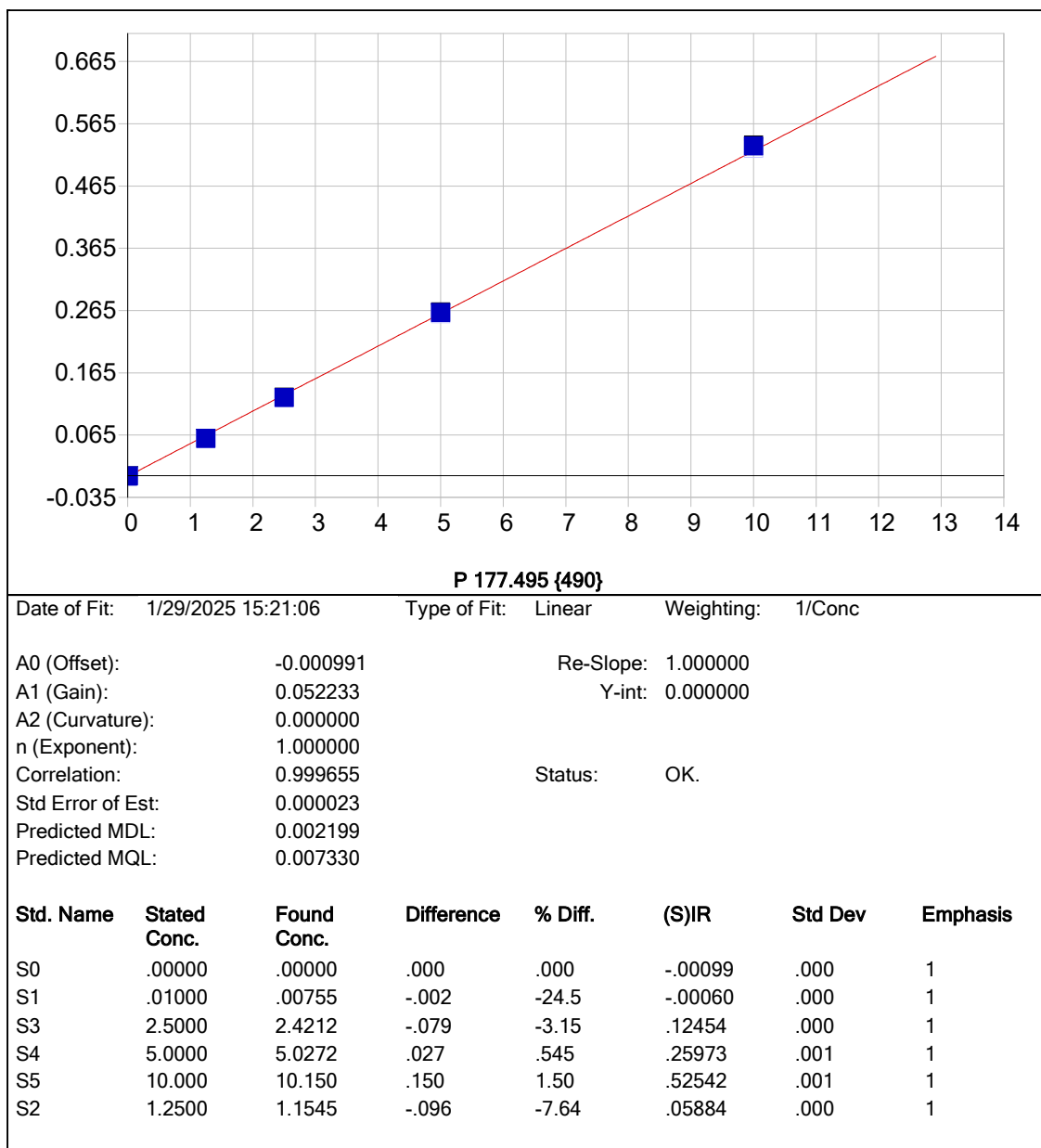
**Zn 213.856 {158}**

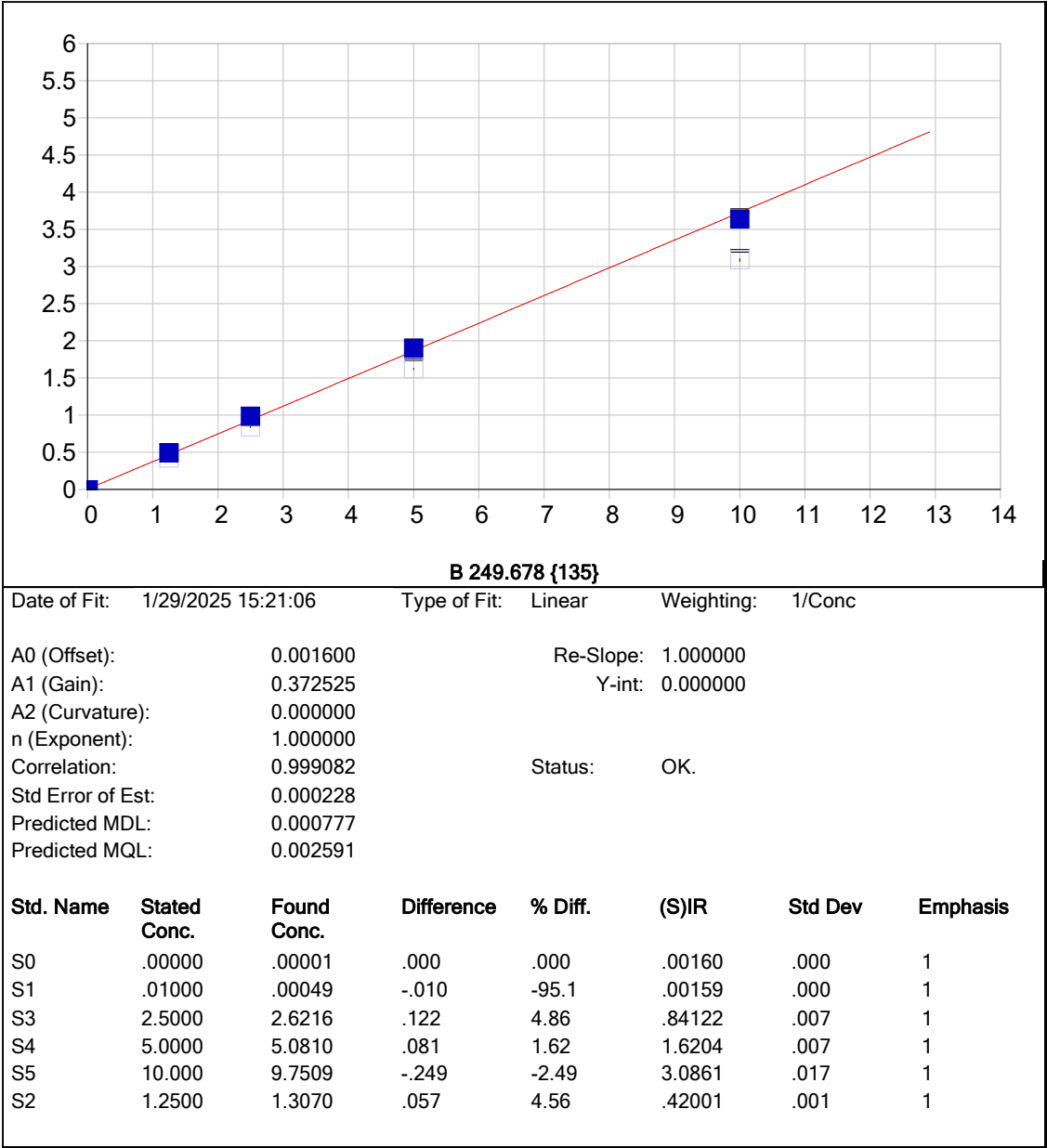
Date of Fit: 1/29/2025 15:21:06 Type of Fit: Linear Weighting: 1/Conc

A0 (Offset): 0.000335 Re-Slope: 1.000000  
A1 (Gain): 0.294981 Y-int: 0.000000  
A2 (Curvature): 0.000000  
n (Exponent): 1.000000  
Correlation: 0.999877 Status: OK.  
Std Error of Est: 0.000331  
Predicted MDL: 0.001811  
Predicted MQL: 0.006037

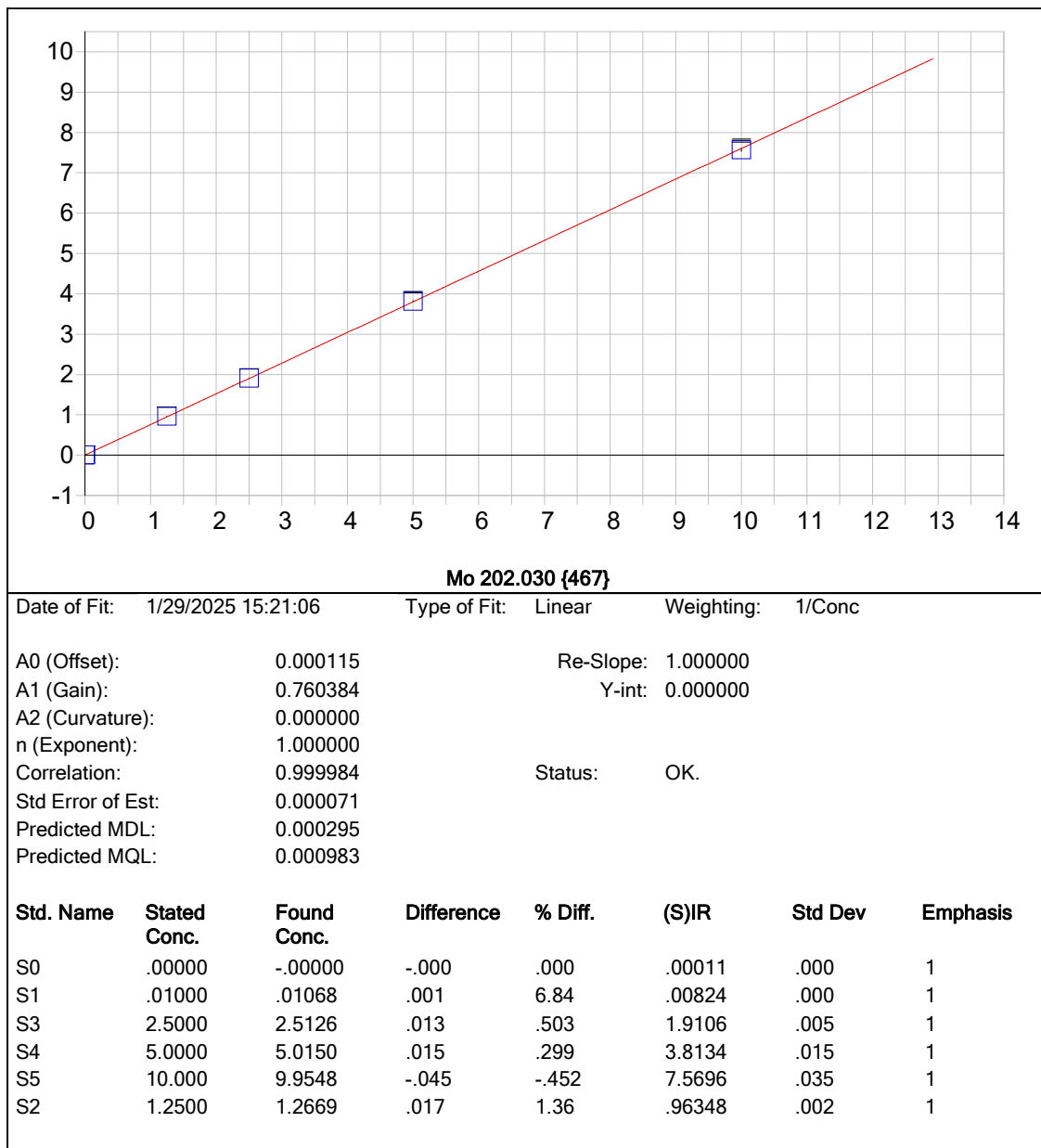
| Std. Name | Stated Conc. | Found Conc. | Difference | % Diff. | (S)IR  | Std Dev | Emphasis |
|-----------|--------------|-------------|------------|---------|--------|---------|----------|
| S0        | .00000       | .00000      | .000       | .000    | .00034 | .000    | 1        |
| S1        | .06000       | .05955      | -.000      | -.755   | .01800 | .001    | 1        |
| S3        | 7.5000       | 7.2935      | -.206      | -2.75   | 2.1601 | .013    | 1        |
| S4        | 15.000       | 15.306      | .306       | 2.04    | 4.5319 | .022    | 1        |
| S5        | 30.000       | 29.990      | -.010      | -.035   | 8.8800 | .010    | 1        |
| S2        | 3.7500       | 3.6615      | -.088      | -2.36   | 1.0846 | .008    | 1        |

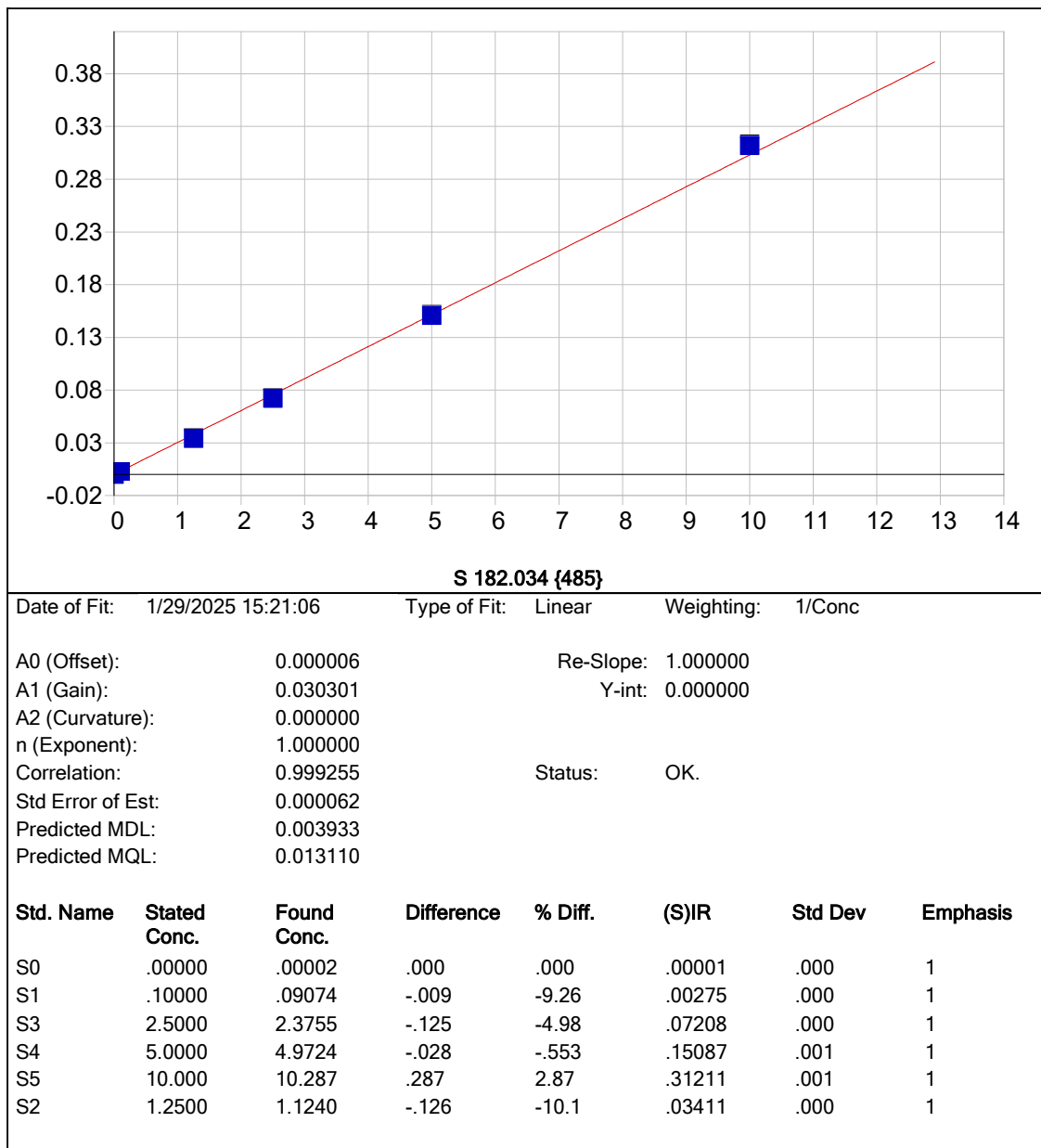


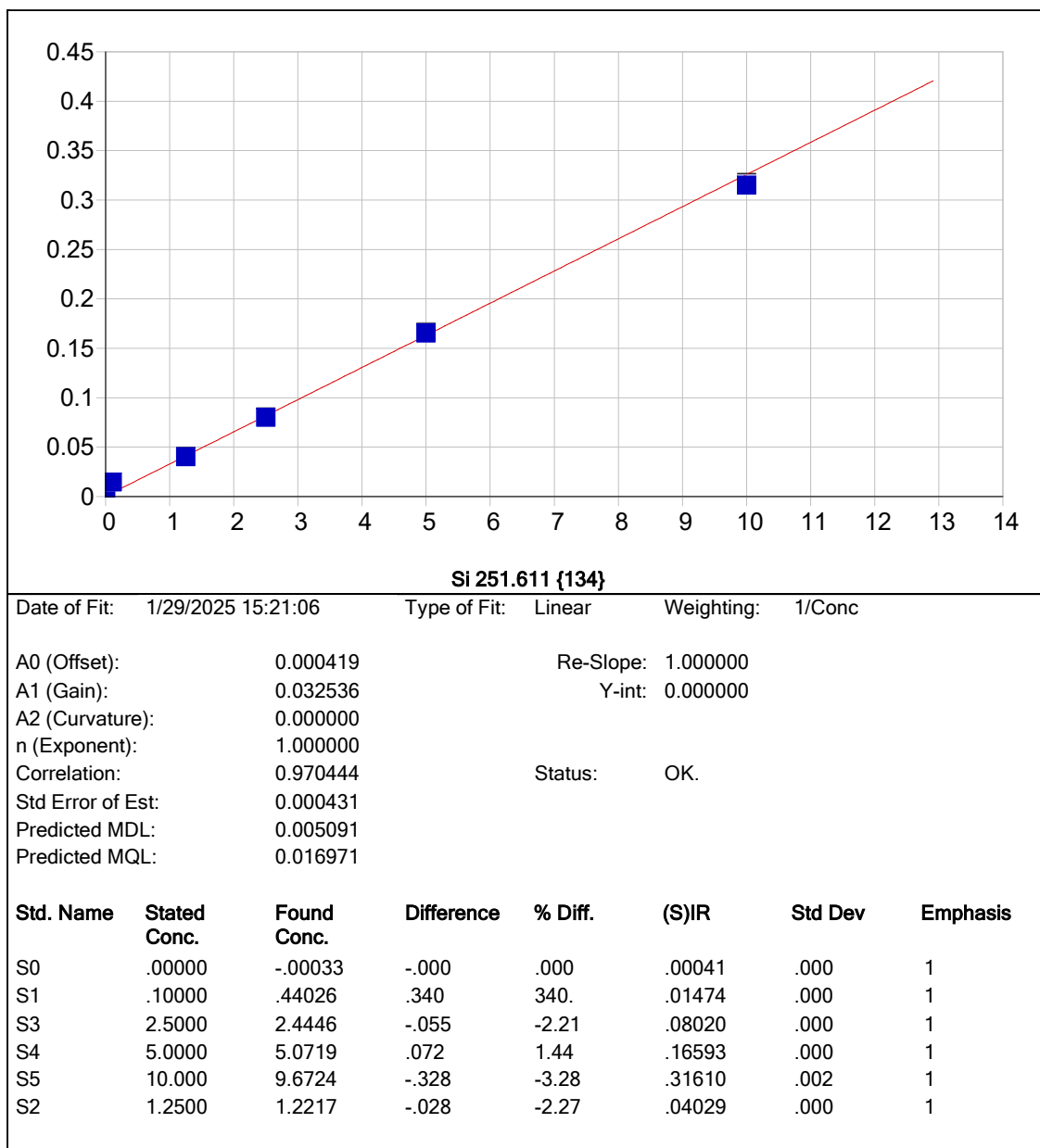


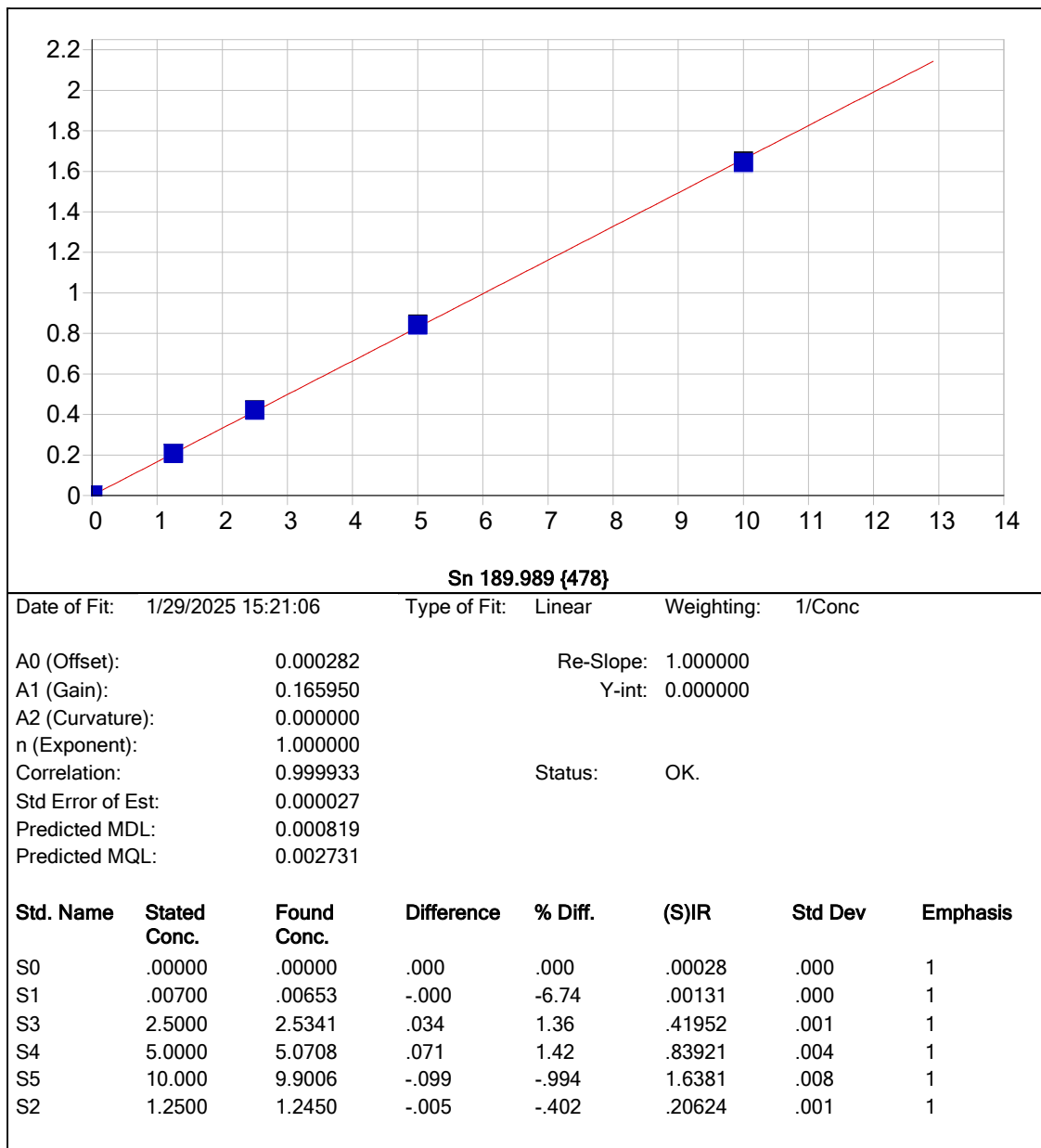


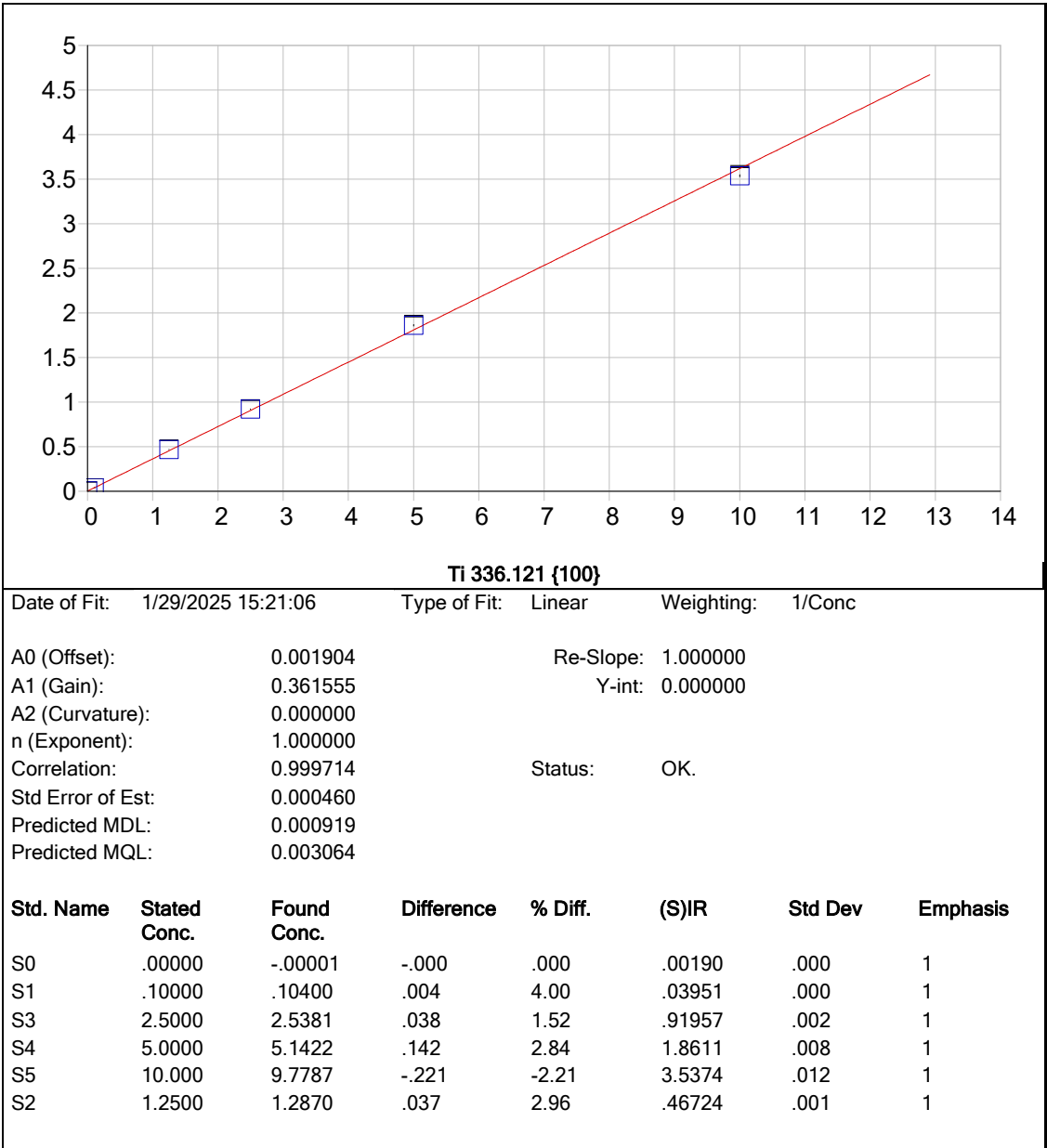


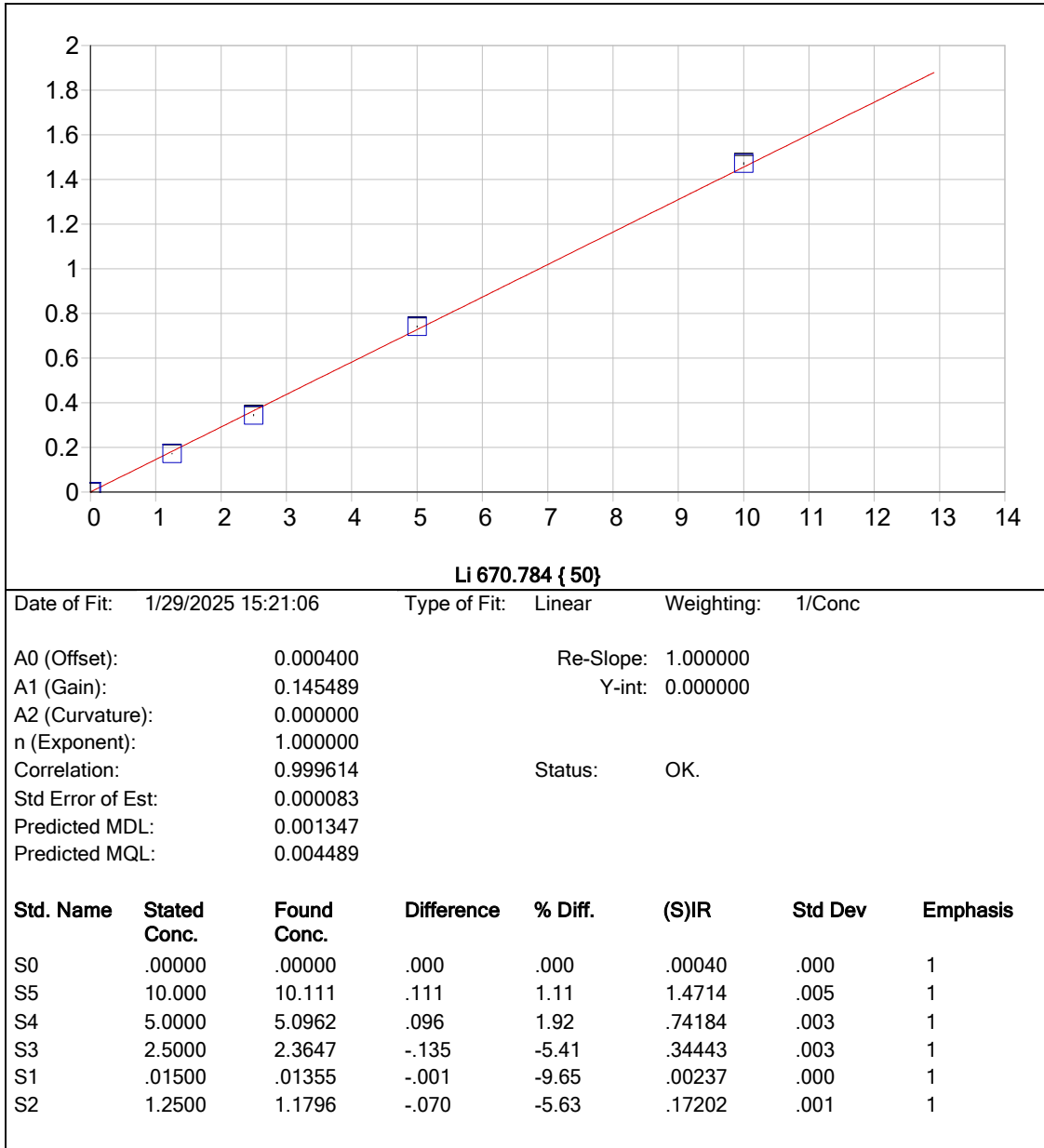


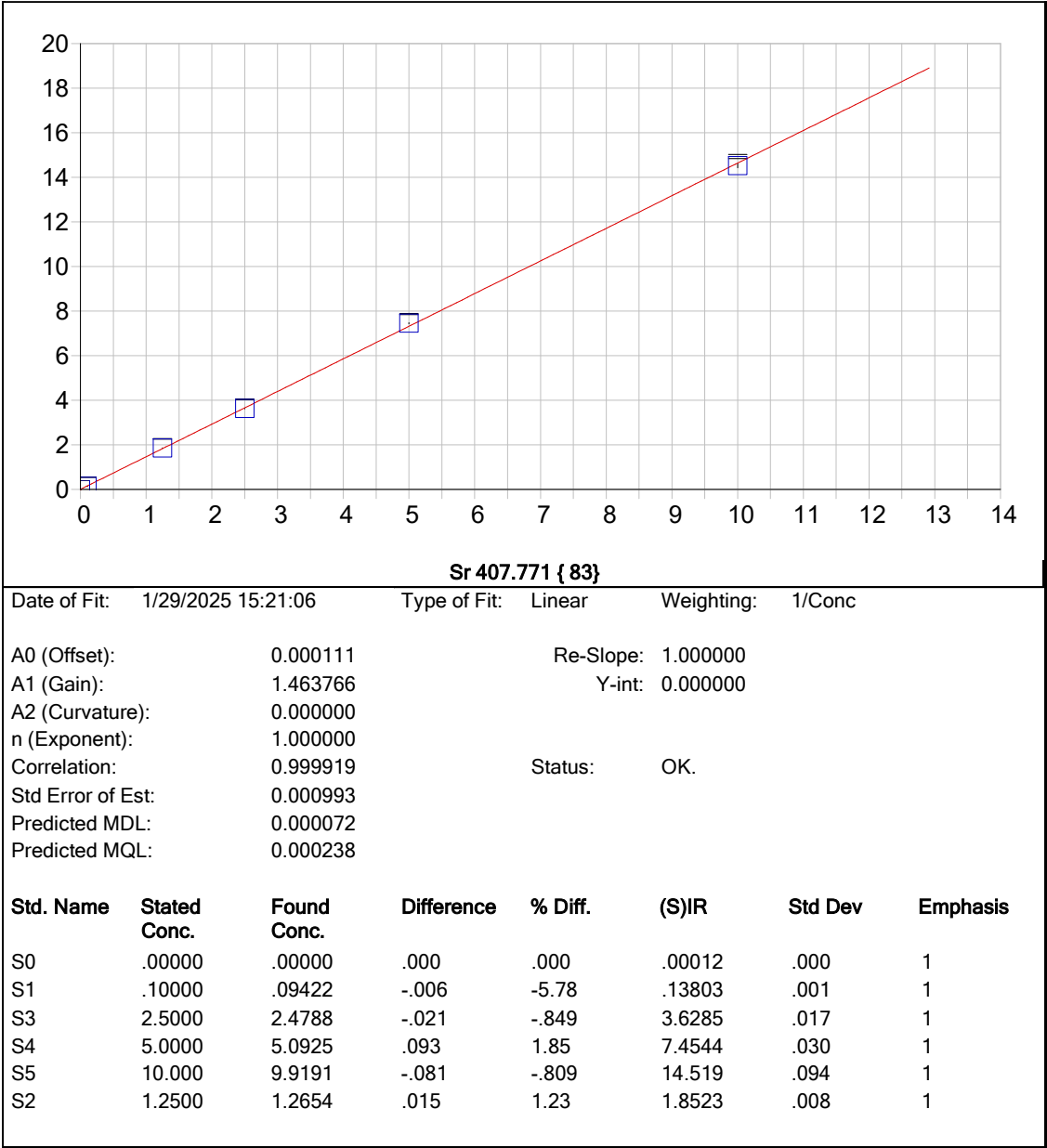


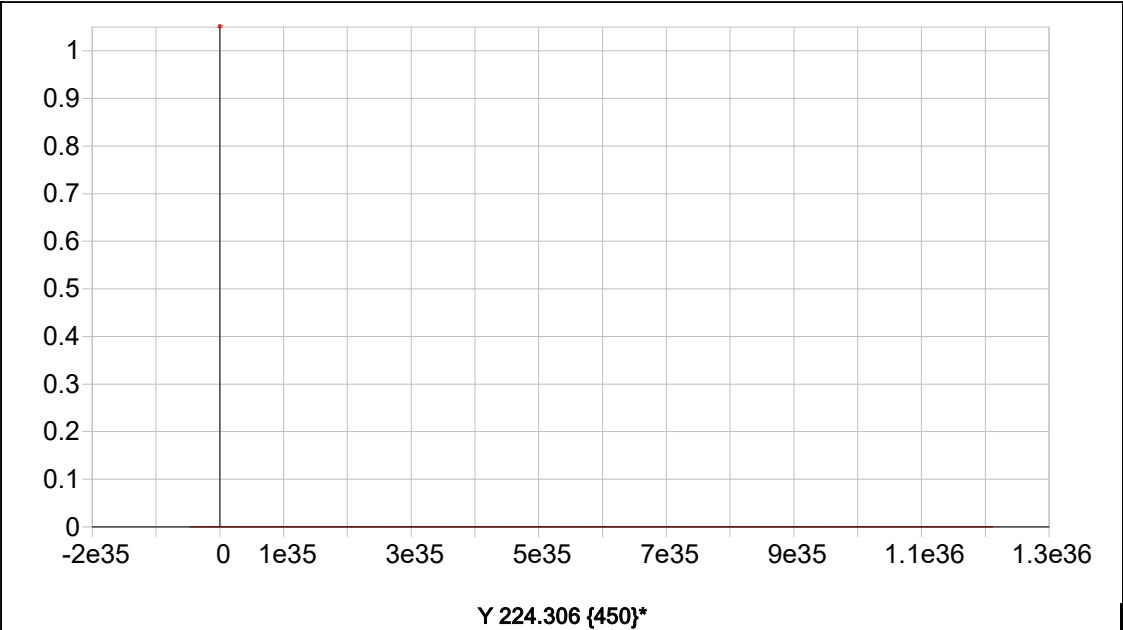








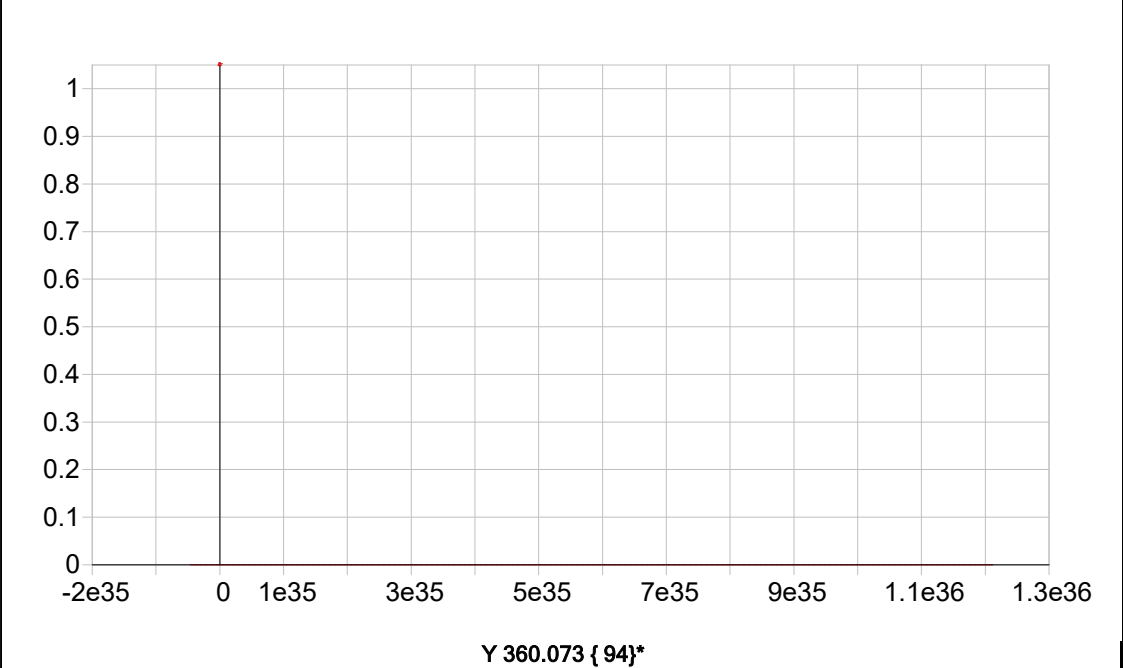




Date of Fit: 1/29/2025 14:43:41      Type of Fit: Linear      Weighting: 1/Conc

|                   |          |           |                        |
|-------------------|----------|-----------|------------------------|
| A0 (Offset):      | 0.000000 | Re-Slope: | 1.000000               |
| A1 (Gain):        | 0.000000 | Y-int:    | 0.000000               |
| A2 (Curvature):   | 0.000000 |           |                        |
| n (Exponent):     | 1.000000 |           |                        |
| Correlation:      | 0.000000 | Status:   | Warning      Zero Gain |
| Std Error of Est: | 0.000000 |           |                        |
| Predicted MDL:    | n/a      |           |                        |
| Predicted MQL:    | n/a      |           |                        |

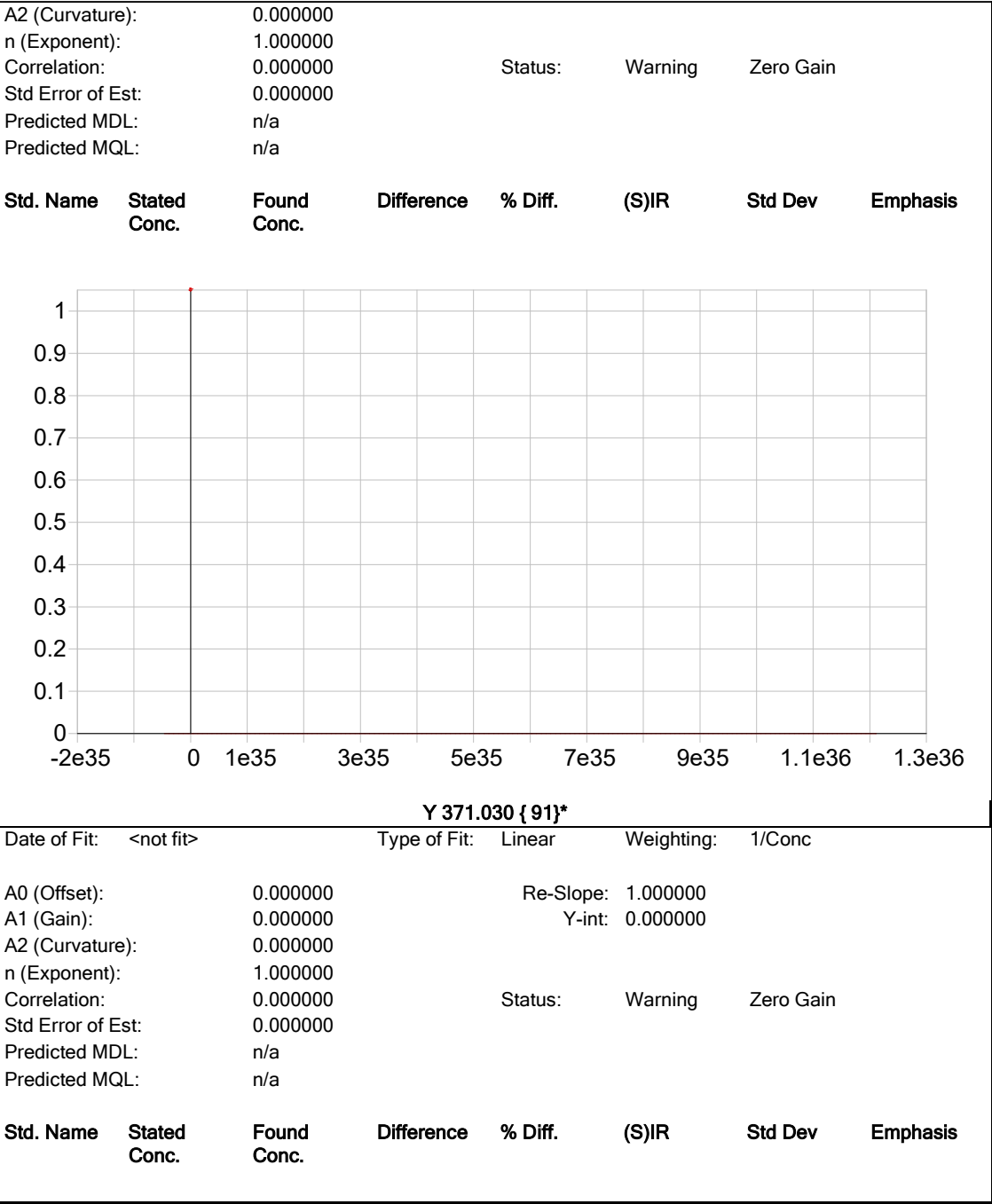
| Std. Name | Stated Conc. | Found Conc. | Difference | % Diff. | (S)IR | Std Dev | Emphasis |
|-----------|--------------|-------------|------------|---------|-------|---------|----------|
|-----------|--------------|-------------|------------|---------|-------|---------|----------|



Date of Fit: <not fit>      Type of Fit: Linear      Weighting: 1/Conc

|              |          |           |          |
|--------------|----------|-----------|----------|
| A0 (Offset): | 0.000000 | Re-Slope: | 1.000000 |
| A1 (Gain):   | 0.000000 | Y-int:    | 0.000000 |







|                   |              |             |            |         |         |           |          |
|-------------------|--------------|-------------|------------|---------|---------|-----------|----------|
| A2 (Curvature):   |              | 0.000000    |            | Status: | Warning | Zero Gain |          |
| n (Exponent):     |              | 1.000000    |            |         |         |           |          |
| Correlation:      |              | 0.000000    |            |         |         |           |          |
| Std Error of Est: |              | 0.000000    |            |         |         |           |          |
| Predicted MDL:    |              | n/a         |            |         |         |           |          |
| Predicted MQL:    |              | n/a         |            |         |         |           |          |
| Std. Name         | Stated Conc. | Found Conc. | Difference | % Diff. | (S)IR   | Std Dev   | Emphasis |

Sample Name: S0      Acquired: 1/29/2025 14:56:12      Type: Cal  
Method: EPA SFAM01.0(v59)      Mode: IR      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: S0      Custom ID2:      Custom ID3:  
Comment:

|        |         |         |         |         |        |         |         |         |
|--------|---------|---------|---------|---------|--------|---------|---------|---------|
| Elem   | As1890  | Tl1908  | Pb2203  | Se1960  | Sb2068 | Al3961  | Ba4934  | Be2348  |
| Units  | Cts/S   | Cts/S   | Cts/S   | Cts/S   | Cts/S  | Cts/S   | Cts/S   | Cts/S   |
| Avg    | -.00017 | .00006  | -.00027 | .00028  | .00029 | .00000  | .00761  | .00011  |
| Stddev | .00007  | .00005  | .00010  | .00015  | .00006 | .00006  | .00033  | .00003  |
| %RSD   | 41.217  | 84.285  | 36.550  | 55.700  | 21.255 | 2834.7  | 4.3132  | 30.545  |
| #1     | -.00021 | .00009  | -.00037 | .00037  | .00030 | -.00003 | .00772  | .00012  |
| #2     | -.00021 | .00009  | -.00018 | .00037  | .00034 | .00007  | .00724  | .00013  |
| #3     | -.00009 | .00000  | -.00025 | .00010  | .00022 | -.00004 | .00786  | .00007  |
| Elem   | Cd2144  | Ca3736  | Cr2677  | Co2286  | Cu3247 | Fe2598  | Mn2576  | Mg2790  |
| Units  | Cts/S   | Cts/S   | Cts/S   | Cts/S   | Cts/S  | Cts/S   | Cts/S   | Cts/S   |
| Avg    | -.00004 | .00004  | -.00000 | .00004  | .00234 | .00002  | -.00001 | -.00007 |
| Stddev | .00003  | .00004  | .00002  | .00020  | .00031 | .00001  | .00002  | .00001  |
| %RSD   | 90.199  | 91.978  | 483.43  | 454.40  | 13.063 | 40.802  | 109.66  | 19.356  |
| #1     | -.00006 | .00006  | -.00002 | .00018  | .00265 | .00002  | .00000  | -.00006 |
| #2     | -.00000 | .00007  | .00001  | .00014  | .00233 | .00001  | -.00003 | -.00007 |
| #3     | -.00004 | -.00000 | .00000  | -.00018 | .00204 | .00003  | -.00002 | -.00009 |
| Elem   | Ni2316  | Ag3280  | Na8183  | V_2924  | Zn2138 | K_7698  | P_1774  | B_2496  |
| Units  | Cts/S   | Cts/S   | Cts/S   | Cts/S   | Cts/S  | Cts/S   | Cts/S   | Cts/S   |
| Avg    | -.00041 | -.00049 | -.00239 | -.00002 | .00034 | .00533  | -.00099 | .00160  |
| Stddev | .00017  | .00002  | .00043  | .00018  | .00028 | .00000  | .00008  | .00015  |
| %RSD   | 42.163  | 4.8886  | 18.020  | 870.57  | 82.440 | .00654  | 8.4921  | 9.1553  |
| #1     | -.00058 | -.00051 | -.00195 | -.00013 | .00046 | .00533  | -.00109 | .00158  |
| #2     | -.00023 | -.00051 | -.00281 | -.00012 | .00002 | .00533  | -.00095 | .00176  |
| #3     | -.00043 | -.00047 | -.00239 | .00019  | .00053 | .00533  | -.00094 | .00147  |
| Elem   | Mo2020  | S_1820  | Si2516  | Sn1899  | Ti3361 | Li6707  | Sr4077  |         |
| Units  | Cts/S   | Cts/S   | Cts/S   | Cts/S   | Cts/S  | Cts/S   | Cts/S   |         |
| Avg    | .00011  | .00001  | .00041  | .00028  | .00190 | .00040  | .00012  |         |
| Stddev | .00017  | .00016  | .00004  | .00003  | .00028 | .00013  | .00006  |         |
| %RSD   | 147.91  | 2320.6  | 9.0902  | 10.948  | 14.895 | 32.698  | 50.886  |         |
| #1     | -.00002 | -.00017 | .00039  | .00030  | .00192 | .00044  | .00006  |         |
| #2     | .00006  | .00006  | .00045  | .00030  | .00161 | .00051  | .00011  |         |
| #3     | .00031  | .00013  | .00038  | .00025  | .00217 | .00026  | .00018  |         |

Sample Name: S0      Acquired: 1/29/2025 14:56:12      Type: Cal  
Method: EPA SFAM01.0(v59)      Mode: IR      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: S0      Custom ID2:      Custom ID3:  
Comment:

| Int. Std. | Y_2243 | Y_3600 | Y_3710 | Y_2243 | In2306 |
|-----------|--------|--------|--------|--------|--------|
| Units     | Cts/S  | Cts/S  | Cts/S  | Cts/S  | Cts/S  |
| Avg       | 3343.6 | 69827. | 13258. | 2338.9 | 4051.8 |
| Stddev    | 25.1   | 2197.  | 109.   | 86.0   | 29.7   |
| %RSD      | .75178 | 3.1458 | .82415 | 3.6779 | .73222 |
| #1        | 3352.8 | 67304. | 13348. | 2241.0 | 4064.7 |
| #2        | 3363.0 | 70864. | 13288. | 2373.1 | 4072.9 |
| #3        | 3315.2 | 71313. | 13136. | 2402.5 | 4017.9 |

Sample Name: S1      Acquired: 1/29/2025 15:00:28      Type: Cal  
Method: EPA SFAM01.0(v59)      Mode: IR      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: S01      Custom ID2:      Custom ID3:  
Comment:

|        |        |        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Elem   | As1890 | Tl1908 | Pb2203 | Se1960 | Sb2068 | Al3961 | Ba4934 | Be2348 |
| Units  | Cts/S  | Cts/S  | Cts/S  | Cts/S  | Cts/S  | Cts/S  | Cts/S  | Cts/S  |
| Avg    | .00048 | .00182 | .00239 | .00257 | .00818 | .00241 | .08724 | .01971 |
| Stddev | .00019 | .00006 | .00010 | .00020 | .00007 | .00009 | .00102 | .00022 |
| %RSD   | 38.611 | 3.3558 | 4.2021 | 7.7950 | .80053 | 3.6535 | 1.1744 | 1.0963 |

|    |        |        |        |        |        |        |        |        |
|----|--------|--------|--------|--------|--------|--------|--------|--------|
| #1 | .00027 | .00189 | .00235 | .00234 | .00816 | .00232 | .08609 | .01946 |
| #2 | .00061 | .00181 | .00231 | .00263 | .00826 | .00242 | .08757 | .01983 |
| #3 | .00057 | .00177 | .00250 | .00273 | .00813 | .00250 | .08806 | .01984 |

|        |        |        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Elem   | Cd2144 | Ca3736 | Cr2677 | Co2286 | Cu3247 | Fe2598 | Mn2576 | Mg2790 |
| Units  | Cts/S  | Cts/S  | Cts/S  | Cts/S  | Cts/S  | Cts/S  | Cts/S  | Cts/S  |
| Avg    | .01398 | .04095 | .00181 | .04519 | .00568 | .00052 | .00132 | .00985 |
| Stddev | .00011 | .00032 | .00006 | .00026 | .00041 | .00002 | .00000 | .00009 |
| %RSD   | .75118 | .77427 | 3.5146 | .57052 | 7.2164 | 4.3711 | .09298 | .89940 |

|    |        |        |        |        |        |        |        |        |
|----|--------|--------|--------|--------|--------|--------|--------|--------|
| #1 | .01388 | .04061 | .00178 | .04540 | .00564 | .00050 | .00131 | .00975 |
| #2 | .01399 | .04101 | .00188 | .04490 | .00611 | .00053 | .00132 | .00990 |
| #3 | .01409 | .04123 | .00176 | .04527 | .00529 | .00054 | .00132 | .00991 |

|        |        |        |        |        |        |        |         |        |
|--------|--------|--------|--------|--------|--------|--------|---------|--------|
| Elem   | Ni2316 | Ag3280 | Na8183 | V_2924 | Zn2138 | K_7698 | P_1774  | B_2496 |
| Units  | Cts/S  | Cts/S  | Cts/S  | Cts/S  | Cts/S  | Cts/S  | Cts/S   | Cts/S  |
| Avg    | .02600 | .00228 | .00772 | .00697 | .01800 | .02193 | -.00060 | .00159 |
| Stddev | .00031 | .00008 | .00050 | .00020 | .00068 | .00020 | .00006  | .00021 |
| %RSD   | 1.1911 | 3.3892 | 6.4102 | 2.9147 | 3.7756 | .89278 | 9.3858  | 13.438 |

|    |        |        |        |        |        |        |         |        |
|----|--------|--------|--------|--------|--------|--------|---------|--------|
| #1 | .02633 | .00222 | .00732 | .00717 | .01879 | .02192 | -.00060 | .00136 |
| #2 | .02598 | .00237 | .00758 | .00698 | .01759 | .02214 | -.00054 | .00164 |
| #3 | .02571 | .00226 | .00827 | .00676 | .01763 | .02175 | -.00066 | .00177 |

|        |        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|--------|
| Elem   | Mo2020 | S_1820 | Si2516 | Sn1899 | Ti3361 | Li6707 | Sr4077 |
| Units  | Cts/S  | Cts/S  | Cts/S  | Cts/S  | Cts/S  | Cts/S  | Cts/S  |
| Avg    | .00824 | .00275 | .01474 | .00131 | .03951 | .00237 | .13803 |
| Stddev | .00016 | .00001 | .00026 | .00010 | .00024 | .00006 | .00138 |
| %RSD   | 1.9621 | .52399 | 1.7816 | 7.8587 | .61200 | 2.7396 | 1.0013 |

|    |        |        |        |        |        |        |        |
|----|--------|--------|--------|--------|--------|--------|--------|
| #1 | .00841 | .00274 | .01502 | .00122 | .03975 | .00236 | .13657 |
| #2 | .00809 | .00276 | .01471 | .00143 | .03950 | .00244 | .13820 |
| #3 | .00822 | .00276 | .01450 | .00129 | .03927 | .00231 | .13932 |

Sample Name: S1      Acquired: 1/29/2025 15:00:28      Type: Cal  
Method: EPA SFAM01.0(v59)      Mode: IR      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: S01      Custom ID2:      Custom ID3:  
Comment:

| Int. Std. | Y_2243 | Y_3600 | Y_3710 | Y_2243 | In2306 |
|-----------|--------|--------|--------|--------|--------|
| Units     | Cts/S  | Cts/S  | Cts/S  | Cts/S  | Cts/S  |
| Avg       | 3304.0 | 69989. | 13082. | 2337.6 | 3957.6 |
| Stddev    | 1.1    | 129.   | 132.   | 8.4    | 2.3    |
| %RSD      | .03434 | .18414 | 1.0070 | .36092 | .05752 |
| #1        | 3303.7 | 70073. | 12955. | 2344.3 | 3955.3 |
| #2        | 3305.3 | 70054. | 13072. | 2340.3 | 3959.8 |
| #3        | 3303.1 | 69841. | 13218. | 2328.1 | 3957.7 |

Sample Name: S2      Acquired: 1/29/2025 15:04:43      Type: Cal  
Method: EPA SFAM01.0(v59)      Mode: IR      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: S02      Custom ID2:      Custom ID3:  
Comment:

|        |               |               |               |               |               |               |               |               |
|--------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Elem   | As1890        | Tl1908        | Pb2203        | Se1960        | Sb2068        | Al3961        | Ba4934        | Be2348        |
| Units  | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         |
| Avg    | <b>.07415</b> | <b>.08683</b> | <b>1.5293</b> | <b>.07533</b> | <b>.16884</b> | <b>.45755</b> | <b>1.0741</b> | <b>.46130</b> |
| Stddev | .00016        | .00054        | .0017         | .00038        | .00024        | .00146        | .0057         | .00202        |
| %RSD   | .21176        | .62320        | .10969        | .49999        | .14481        | .31956        | .53460        | .43816        |

|    |               |               |               |               |               |               |               |               |
|----|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| #1 | <b>.07430</b> | <b>.08647</b> | <b>1.5280</b> | <b>.07538</b> | <b>.16858</b> | <b>.45601</b> | <b>1.0680</b> | <b>.46241</b> |
| #2 | <b>.07399</b> | <b>.08745</b> | <b>1.5289</b> | <b>.07494</b> | <b>.16890</b> | <b>.45773</b> | <b>1.0749</b> | <b>.46252</b> |
| #3 | <b>.07415</b> | <b>.08657</b> | <b>1.5312</b> | <b>.07568</b> | <b>.16906</b> | <b>.45892</b> | <b>1.0794</b> | <b>.45897</b> |

|        |               |               |               |               |               |               |               |               |
|--------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Elem   | Cd2144        | Ca3736        | Cr2677        | Co2286        | Cu3247        | Fe2598        | Mn2576        | Mg2790        |
| Units  | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         |
| Avg    | <b>1.7461</b> | <b>.53066</b> | <b>.67926</b> | <b>.56852</b> | <b>.43546</b> | <b>.20227</b> | <b>.33248</b> | <b>.13659</b> |
| Stddev | .0036         | .00141        | .00036        | .00112        | .00122        | .00081        | .00130        | .00040        |
| %RSD   | .20607        | .26556        | .05361        | .19639        | .27931        | .40246        | .39170        | .29632        |

|    |               |               |               |               |               |               |               |               |
|----|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| #1 | <b>1.7421</b> | <b>.52906</b> | <b>.67895</b> | <b>.56730</b> | <b>.43506</b> | <b>.20144</b> | <b>.33122</b> | <b>.13613</b> |
| #2 | <b>1.7475</b> | <b>.53124</b> | <b>.67966</b> | <b>.56876</b> | <b>.43683</b> | <b>.20232</b> | <b>.33241</b> | <b>.13674</b> |
| #3 | <b>1.7489</b> | <b>.53169</b> | <b>.67917</b> | <b>.56949</b> | <b>.43450</b> | <b>.20306</b> | <b>.33382</b> | <b>.13689</b> |

|        |               |               |               |               |               |               |               |               |
|--------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Elem   | Ni2316        | Ag3280        | Na8183        | V_2924        | Zn2138        | K_7698        | P_1774        | B_2496        |
| Units  | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         |
| Avg    | <b>.40912</b> | <b>.08340</b> | <b>.07299</b> | <b>.07757</b> | <b>1.0846</b> | <b>.13870</b> | <b>.05884</b> | <b>.42001</b> |
| Stddev | .00182        | .00018        | .00095        | .00010        | .0083         | .00033        | .00005        | .00061        |
| %RSD   | .44571        | .21613        | 1.2960        | .12663        | .76794        | .23605        | .09312        | .14534        |

|    |               |               |               |               |               |               |               |               |
|----|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| #1 | <b>.40704</b> | <b>.08358</b> | <b>.07406</b> | <b>.07752</b> | <b>1.0750</b> | <b>.13837</b> | <b>.05882</b> | <b>.42043</b> |
| #2 | <b>.40993</b> | <b>.08339</b> | <b>.07260</b> | <b>.07751</b> | <b>1.0903</b> | <b>.13870</b> | <b>.05880</b> | <b>.42029</b> |
| #3 | <b>.41041</b> | <b>.08322</b> | <b>.07230</b> | <b>.07769</b> | <b>1.0884</b> | <b>.13902</b> | <b>.05891</b> | <b>.41931</b> |

|        |               |               |               |               |               |               |               |  |
|--------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|--|
| Elem   | Mo2020        | S_1820        | Si2516        | Sn1899        | Ti3361        | Li6707        | Sr4077        |  |
| Units  | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         |  |
| Avg    | <b>.96348</b> | <b>.03411</b> | <b>.04029</b> | <b>.20624</b> | <b>.46724</b> | <b>.17202</b> | <b>1.8523</b> |  |
| Stddev | .00192        | .00027        | .00013        | .00061        | .00140        | .00087        | .0078         |  |
| %RSD   | .19944        | .78002        | .32056        | .29760        | .29875        | .50322        | .42338        |  |

|    |               |               |               |               |               |               |               |  |
|----|---------------|---------------|---------------|---------------|---------------|---------------|---------------|--|
| #1 | <b>.96151</b> | <b>.03437</b> | <b>.04016</b> | <b>.20553</b> | <b>.46600</b> | <b>.17121</b> | <b>1.8450</b> |  |
| #2 | <b>.96358</b> | <b>.03384</b> | <b>.04030</b> | <b>.20661</b> | <b>.46875</b> | <b>.17192</b> | <b>1.8515</b> |  |
| #3 | <b>.96535</b> | <b>.03414</b> | <b>.04041</b> | <b>.20658</b> | <b>.46696</b> | <b>.17293</b> | <b>1.8606</b> |  |



Sample Name: S2      Acquired: 1/29/2025 15:04:43      Type: Cal  
Method: EPA SFAM01.0(v59)      Mode: IR      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: S02      Custom ID2:      Custom ID3:  
Comment:

| Int. Std. | Y_2243 | Y_3600 | Y_3710 | Y_2243 | In2306 |
|-----------|--------|--------|--------|--------|--------|
| Units     | Cts/S  | Cts/S  | Cts/S  | Cts/S  | Cts/S  |
| Avg       | 3203.8 | 66626. | 13210. | 2232.1 | 3628.8 |
| Stddev    | 1.0    | 40.    | 69.    | 9.5    | 5.1    |
| %RSD      | .03155 | .06048 | .51886 | .42703 | .14154 |
| #1        | 3204.5 | 66655. | 13168. | 2235.3 | 3634.3 |
| #2        | 3204.2 | 66580. | 13173. | 2221.3 | 3624.2 |
| #3        | 3202.6 | 66643. | 13289. | 2239.5 | 3627.9 |

Sample Name: S3      Acquired: 1/29/2025 15:08:39      Type: Cal  
Method: EPA SFAM01.0(v59)      Mode: IR      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: S03      Custom ID2:      Custom ID3:  
Comment:

|        |               |               |               |               |               |               |               |               |
|--------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Elem   | As1890        | Tl1908        | Pb2203        | Se1960        | Sb2068        | Al3961        | Ba4934        | Be2348        |
| Units  | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         |
| Avg    | <b>.15018</b> | <b>.17295</b> | <b>3.0860</b> | <b>.15104</b> | <b>.34204</b> | <b>.91985</b> | <b>2.1382</b> | <b>.93362</b> |
| Stddev | .00026        | .00034        | .0076         | .00039        | .00048        | .00564        | .0217         | .00694        |
| %RSD   | .17462        | .19691        | .24619        | .25790        | .13986        | .61292        | 1.0149        | .74382        |

|    |               |               |               |               |               |               |               |               |
|----|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| #1 | <b>.15027</b> | <b>.17330</b> | <b>3.0908</b> | <b>.15061</b> | <b>.34199</b> | <b>.92430</b> | <b>2.1565</b> | <b>.92994</b> |
| #2 | <b>.14988</b> | <b>.17262</b> | <b>3.0773</b> | <b>.15136</b> | <b>.34159</b> | <b>.92175</b> | <b>2.1440</b> | <b>.92929</b> |
| #3 | <b>.15038</b> | <b>.17292</b> | <b>3.0901</b> | <b>.15115</b> | <b>.34255</b> | <b>.91351</b> | <b>2.1142</b> | <b>.94163</b> |

|        |               |               |               |               |               |               |               |               |
|--------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Elem   | Cd2144        | Ca3736        | Cr2677        | Co2286        | Cu3247        | Fe2598        | Mn2576        | Mg2790        |
| Units  | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         |
| Avg    | <b>3.5417</b> | <b>1.0548</b> | <b>1.3386</b> | <b>1.1436</b> | <b>.85896</b> | <b>.39682</b> | <b>.66193</b> | <b>.27536</b> |
| Stddev | .0091         | .0051         | .0029         | .0021         | .00189        | .00182        | .00348        | .00082        |
| %RSD   | .25706        | .48743        | .22006        | .18603        | .21956        | .45786        | .52519        | .29633        |

|    |               |               |               |               |               |               |               |               |
|----|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| #1 | <b>3.5438</b> | <b>1.0593</b> | <b>1.3417</b> | <b>1.1440</b> | <b>.86113</b> | <b>.39849</b> | <b>.66439</b> | <b>.27592</b> |
| #2 | <b>3.5318</b> | <b>1.0560</b> | <b>1.3359</b> | <b>1.1413</b> | <b>.85805</b> | <b>.39707</b> | <b>.66344</b> | <b>.27574</b> |
| #3 | <b>3.5496</b> | <b>1.0492</b> | <b>1.3380</b> | <b>1.1454</b> | <b>.85770</b> | <b>.39489</b> | <b>.65795</b> | <b>.27443</b> |

|        |               |               |               |               |               |               |               |               |
|--------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Elem   | Ni2316        | Ag3280        | Na8183        | V_2924        | Zn2138        | K_7698        | P_1774        | B_2496        |
| Units  | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         |
| Avg    | <b>.82257</b> | <b>.16941</b> | <b>.14805</b> | <b>.15355</b> | <b>2.1601</b> | <b>.27496</b> | <b>.12454</b> | <b>.84122</b> |
| Stddev | .00044        | .00021        | .00048        | .00034        | .0129         | .00157        | .00021        | .00742        |
| %RSD   | .05302        | .12196        | .32579        | .22114        | .59784        | .57170        | .17065        | .88184        |

|    |               |               |               |               |               |               |               |               |
|----|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| #1 | <b>.82283</b> | <b>.16937</b> | <b>.14810</b> | <b>.15389</b> | <b>2.1666</b> | <b>.27628</b> | <b>.12430</b> | <b>.83878</b> |
| #2 | <b>.82280</b> | <b>.16963</b> | <b>.14754</b> | <b>.15321</b> | <b>2.1685</b> | <b>.27538</b> | <b>.12471</b> | <b>.83533</b> |
| #3 | <b>.82206</b> | <b>.16922</b> | <b>.14850</b> | <b>.15355</b> | <b>2.1453</b> | <b>.27322</b> | <b>.12461</b> | <b>.84956</b> |

|        |               |               |               |               |               |               |               |
|--------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Elem   | Mo2020        | S_1820        | Si2516        | Sn1899        | Ti3361        | Li6707        | Sr4077        |
| Units  | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         |
| Avg    | <b>1.9106</b> | <b>.07208</b> | <b>.08020</b> | <b>.41952</b> | <b>.91957</b> | <b>.34443</b> | <b>3.6285</b> |
| Stddev | .0046         | .00022        | .00021        | .00065        | .00218        | .00320        | .0168         |
| %RSD   | .23932        | .31187        | .26698        | .15491        | .23660        | .92845        | .46261        |

|    |               |               |               |               |               |               |               |
|----|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| #1 | <b>1.9102</b> | <b>.07196</b> | <b>.07997</b> | <b>.41951</b> | <b>.92196</b> | <b>.34706</b> | <b>3.6475</b> |
| #2 | <b>1.9063</b> | <b>.07194</b> | <b>.08023</b> | <b>.41888</b> | <b>.91770</b> | <b>.34536</b> | <b>3.6220</b> |
| #3 | <b>1.9154</b> | <b>.07234</b> | <b>.08040</b> | <b>.42018</b> | <b>.91905</b> | <b>.34087</b> | <b>3.6159</b> |

Sample Name: S3      Acquired: 1/29/2025 15:08:39      Type: Cal  
Method: EPA SFAM01.0(v59)      Mode: IR      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: S03      Custom ID2:      Custom ID3:  
Comment:

| Int. Std. | Y_2243 | Y_3600 | Y_3710 | Y_2243 | In2306 |
|-----------|--------|--------|--------|--------|--------|
| Units     | Cts/S  | Cts/S  | Cts/S  | Cts/S  | Cts/S  |
| Avg       | 3093.8 | 65077. | 12911. | 2185.2 | 3420.0 |
| Stddev    | 6.5    | 60.    | 84.    | 2.8    | 1.8    |
| %RSD      | .21163 | .09216 | .65340 | .12940 | .05360 |
| #1        | 3098.2 | 65017. | 12956. | 2187.9 | 3421.7 |
| #2        | 3096.8 | 65077. | 12964. | 2182.3 | 3420.0 |
| #3        | 3086.2 | 65137. | 12814. | 2185.6 | 3418.1 |

Sample Name: S4      Acquired: 1/29/2025 15:12:36      Type: Cal  
Method: EPA SFAM01.0(v59)      Mode: IR      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: S04      Custom ID2:      Custom ID3:  
Comment:

|        |               |               |               |               |               |               |               |               |
|--------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Elem   | As1890        | Tl1908        | Pb2203        | Se1960        | Sb2068        | Al3961        | Ba4934        | Be2348        |
| Units  | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         |
| Avg    | <b>.30725</b> | <b>.33591</b> | <b>6.1962</b> | <b>.30623</b> | <b>.69977</b> | <b>1.9216</b> | <b>4.4517</b> | <b>1.8310</b> |
| Stddev | .00197        | .00257        | .0239         | .00175        | .00450        | .0071         | .0088         | .0065         |
| %RSD   | .64176        | .76562        | .38637        | .57105        | .64316        | .37038        | .19862        | .35386        |

|    |               |               |               |               |               |               |               |               |
|----|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| #1 | <b>.30587</b> | <b>.33535</b> | <b>6.1888</b> | <b>.30498</b> | <b>.69543</b> | <b>1.9178</b> | <b>4.4595</b> | <b>1.8297</b> |
| #2 | <b>.30638</b> | <b>.33367</b> | <b>6.1769</b> | <b>.30549</b> | <b>.69947</b> | <b>1.9298</b> | <b>4.4533</b> | <b>1.8253</b> |
| #3 | <b>.30951</b> | <b>.33872</b> | <b>6.2230</b> | <b>.30823</b> | <b>.70441</b> | <b>1.9172</b> | <b>4.4421</b> | <b>1.8380</b> |

|        |               |               |               |               |               |               |               |               |
|--------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Elem   | Cd2144        | Ca3736        | Cr2677        | Co2286        | Cu3247        | Fe2598        | Mn2576        | Mg2790        |
| Units  | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         |
| Avg    | <b>7.0497</b> | <b>2.1640</b> | <b>2.6144</b> | <b>2.2941</b> | <b>1.7986</b> | <b>.79964</b> | <b>1.3789</b> | <b>.57519</b> |
| Stddev | .0228         | .0031         | .0024         | .0077         | .0079         | .00219        | .0029         | .00099        |
| %RSD   | .32412        | .14243        | .09257        | .33792        | .43802        | .27350        | .20846        | .17143        |

|    |               |               |               |               |               |               |               |               |
|----|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| #1 | <b>7.0474</b> | <b>2.1629</b> | <b>2.6119</b> | <b>2.2900</b> | <b>1.8068</b> | <b>.79798</b> | <b>1.3808</b> | <b>.57477</b> |
| #2 | <b>7.0281</b> | <b>2.1675</b> | <b>2.6167</b> | <b>2.2893</b> | <b>1.7911</b> | <b>.80212</b> | <b>1.3803</b> | <b>.57631</b> |
| #3 | <b>7.0736</b> | <b>2.1616</b> | <b>2.6147</b> | <b>2.3031</b> | <b>1.7979</b> | <b>.79882</b> | <b>1.3756</b> | <b>.57448</b> |

|        |               |               |               |               |               |               |               |               |
|--------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Elem   | Ni2316        | Ag3280        | Na8183        | V_2924        | Zn2138        | K_7698        | P_1774        | B_2496        |
| Units  | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         |
| Avg    | <b>1.6383</b> | <b>.34636</b> | <b>.31585</b> | <b>.30950</b> | <b>4.5319</b> | <b>.56398</b> | <b>.25973</b> | <b>1.6204</b> |
| Stddev | .0048         | .00023        | .00285        | .00081        | .0224         | .00153        | .00087        | .0070         |
| %RSD   | .29402        | .06740        | .90291        | .26195        | .49512        | .27055        | .33684        | .43138        |

|    |               |               |               |               |               |               |               |               |
|----|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| #1 | <b>1.6374</b> | <b>.34626</b> | <b>.31887</b> | <b>.31008</b> | <b>4.5552</b> | <b>.56335</b> | <b>.25969</b> | <b>1.6256</b> |
| #2 | <b>1.6341</b> | <b>.34663</b> | <b>.31320</b> | <b>.30857</b> | <b>4.5302</b> | <b>.56571</b> | <b>.25888</b> | <b>1.6125</b> |
| #3 | <b>1.6436</b> | <b>.34620</b> | <b>.31549</b> | <b>.30984</b> | <b>4.5104</b> | <b>.56286</b> | <b>.26062</b> | <b>1.6232</b> |

|        |               |               |               |               |               |               |               |  |
|--------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|--|
| Elem   | Mo2020        | S_1820        | Si2516        | Sn1899        | Ti3361        | Li6707        | Sr4077        |  |
| Units  | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         |  |
| Avg    | <b>3.8134</b> | <b>.15087</b> | <b>.16593</b> | <b>.83921</b> | <b>1.8611</b> | <b>.74184</b> | <b>7.4544</b> |  |
| Stddev | .0155         | .00054        | .00044        | .00383        | .0082         | .00261        | .0299         |  |
| %RSD   | .40535        | .35989        | .26614        | .45602        | .44177        | .35236        | .40089        |  |

|    |               |               |               |               |               |               |               |  |
|----|---------------|---------------|---------------|---------------|---------------|---------------|---------------|--|
| #1 | <b>3.8044</b> | <b>.15049</b> | <b>.16639</b> | <b>.83786</b> | <b>1.8673</b> | <b>.74240</b> | <b>7.4219</b> |  |
| #2 | <b>3.8046</b> | <b>.15061</b> | <b>.16587</b> | <b>.83624</b> | <b>1.8518</b> | <b>.74413</b> | <b>7.4807</b> |  |
| #3 | <b>3.8313</b> | <b>.15149</b> | <b>.16551</b> | <b>.84353</b> | <b>1.8641</b> | <b>.73899</b> | <b>7.4606</b> |  |

Sample Name: S4      Acquired: 1/29/2025 15:12:36      Type: Cal  
Method: EPA SFAM01.0(v59)      Mode: IR      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: S04      Custom ID2:      Custom ID3:  
Comment:

| Int. Std. | Y_2243 | Y_3600 | Y_3710 | Y_2243 | In2306 |
|-----------|--------|--------|--------|--------|--------|
| Units     | Cts/S  | Cts/S  | Cts/S  | Cts/S  | Cts/S  |
| Avg       | 2910.8 | 62779. | 12719. | 2087.3 | 3166.3 |
| Stddev    | 6.8    | 119.   | 60.    | 3.8    | 4.6    |
| %RSD      | .23497 | .18937 | .47487 | .18155 | .14498 |
| #1        | 2917.5 | 62915. | 12711. | 2083.0 | 3168.0 |
| #2        | 2911.1 | 62698. | 12783. | 2088.8 | 3169.8 |
| #3        | 2903.8 | 62722. | 12663. | 2090.1 | 3161.1 |

Sample Name: S5      Acquired: 1/29/2025 15:16:38      Type: Cal  
Method: EPA SFAM01.0(v59)      Mode: IR      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: S05      Custom ID2:      Custom ID3:  
Comment:

|        |               |               |               |               |               |               |               |               |
|--------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Elem   | As1890        | Tl1908        | Pb2203        | Se1960        | Sb2068        | Al3961        | Ba4934        | Be2348        |
| Units  | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         |
| Avg    | <b>.63609</b> | <b>.63940</b> | <b>12.188</b> | <b>.62626</b> | <b>1.4480</b> | <b>3.8556</b> | <b>8.5860</b> | <b>3.6229</b> |
| Stddev | .00279        | .00600        | .047          | .00264        | .0057         | .0227         | .0387         | .0189         |
| %RSD   | .43819        | .93794        | .38749        | .42103        | .39622        | .58992        | .45094        | .52172        |

|    |        |        |        |        |        |        |        |        |
|----|--------|--------|--------|--------|--------|--------|--------|--------|
| #1 | .63463 | .63355 | 12.172 | .62396 | 1.4449 | 3.8294 | 8.6290 | 3.6089 |
| #2 | .63433 | .63910 | 12.151 | .62568 | 1.4445 | 3.8676 | 8.5539 | 3.6154 |
| #3 | .63930 | .64554 | 12.242 | .62914 | 1.4546 | 3.8699 | 8.5750 | 3.6444 |

|        |               |               |               |               |               |               |               |               |
|--------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Elem   | Cd2144        | Ca3736        | Cr2677        | Co2286        | Cu3247        | Fe2598        | Mn2576        | Mg2790        |
| Units  | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         |
| Avg    | <b>13.640</b> | <b>4.1591</b> | <b>4.9779</b> | <b>4.5210</b> | <b>3.4418</b> | <b>1.5449</b> | <b>2.5966</b> | <b>1.1285</b> |
| Stddev | .060          | .0184         | .0117         | .0163         | .0133         | .0045         | .0037         | .0014         |
| %RSD   | .43985        | .44137        | .23503        | .35964        | .38617        | .28926        | .14407        | .12029        |

|    |        |        |        |        |        |        |        |        |
|----|--------|--------|--------|--------|--------|--------|--------|--------|
| #1 | 13.615 | 4.1415 | 4.9760 | 4.5145 | 3.4303 | 1.5495 | 2.5947 | 1.1299 |
| #2 | 13.596 | 4.1781 | 4.9905 | 4.5090 | 3.4387 | 1.5447 | 2.6009 | 1.1286 |
| #3 | 13.708 | 4.1575 | 4.9673 | 4.5395 | 3.4563 | 1.5405 | 2.5941 | 1.1272 |

|        |               |               |               |               |               |               |               |               |
|--------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Elem   | Ni2316        | Ag3280        | Na8183        | V_2924        | Zn2138        | K_7698        | P_1774        | B_2496        |
| Units  | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         |
| Avg    | <b>3.2083</b> | <b>.71171</b> | <b>.59220</b> | <b>.58850</b> | <b>8.8800</b> | <b>1.1614</b> | <b>.52542</b> | <b>3.0861</b> |
| Stddev | .0138         | .00061        | .00339        | .00158        | .0096         | .0044         | .00135        | .0168         |
| %RSD   | .42950        | .08509        | .57187        | .26810        | .10761        | .37563        | .25671        | .54269        |

|    |        |        |        |        |        |        |        |        |
|----|--------|--------|--------|--------|--------|--------|--------|--------|
| #1 | 3.2051 | .71237 | .58886 | .58756 | 8.8707 | 1.1661 | .52612 | 3.0713 |
| #2 | 3.1964 | .71117 | .59212 | .58762 | 8.8795 | 1.1607 | .52387 | 3.0826 |
| #3 | 3.2234 | .71159 | .59563 | .59032 | 8.8898 | 1.1574 | .52628 | 3.1043 |

|        |               |               |               |               |               |               |               |  |
|--------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|--|
| Elem   | Mo2020        | S_1820        | Si2516        | Sn1899        | Ti3361        | Li6707        | Sr4077        |  |
| Units  | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         |  |
| Avg    | <b>7.5696</b> | <b>.31211</b> | <b>.31610</b> | <b>1.6381</b> | <b>3.5374</b> | <b>1.4714</b> | <b>14.519</b> |  |
| Stddev | .0353         | .00108        | .00168        | .0079         | .0121         | .0046         | .094          |  |
| %RSD   | .46628        | .34543        | .52995        | .48358        | .34280        | .31472        | .64565        |  |

|    |        |        |        |        |        |        |        |  |
|----|--------|--------|--------|--------|--------|--------|--------|--|
| #1 | 7.5452 | .31178 | .31463 | 1.6374 | 3.5318 | 1.4756 | 14.576 |  |
| #2 | 7.5536 | .31123 | .31574 | 1.6306 | 3.5291 | 1.4722 | 14.411 |  |
| #3 | 7.6101 | .31331 | .31793 | 1.6464 | 3.5513 | 1.4665 | 14.570 |  |

Sample Name: S5      Acquired: 1/29/2025 15:16:38      Type: Cal  
Method: EPA SFAM01.0(v59)      Mode: IR      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: S05      Custom ID2:      Custom ID3:  
Comment:

| Int. Std. | Y_2243 | Y_3600 | Y_3710 | Y_2243 | In2306 |
|-----------|--------|--------|--------|--------|--------|
| Units     | Cts/S  | Cts/S  | Cts/S  | Cts/S  | Cts/S  |
| Avg       | 2628.7 | 59032. | 12208. | 1910.3 | 2859.1 |
| Stddev    | 10.1   | 22.    | 72.    | 3.1    | 11.2   |
| %RSD      | .38465 | .03651 | .59286 | .16315 | .39149 |
| #1        | 2635.2 | 59052. | 12266. | 1910.5 | 2865.0 |
| #2        | 2633.8 | 59036. | 12231. | 1913.3 | 2866.1 |
| #3        | 2617.1 | 59009. | 12127. | 1907.1 | 2846.2 |

Sample Name: S6      Acquired: 1/29/2025 15:21:07      Type: Cal  
Method: EPA SFAM01.0(v59)      Mode: IR      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: S06      Custom ID2:      Custom ID3:  
Comment:

|        |               |               |               |               |               |
|--------|---------------|---------------|---------------|---------------|---------------|
| Elem   | Al3961        | Ca3736        | Fe2598        | Mg2790        | Na8183        |
| Units  | Cts/S         | Cts/S         | Cts/S         | Cts/S         | Cts/S         |
| Avg    | <b>11.058</b> | <b>7.2336</b> | <b>4.3895</b> | <b>1.9835</b> | <b>1.7645</b> |
| Stddev | .022          | .0278         | .0220         | .0058         | .0085         |
| %RSD   | .19895        | .38421        | .50066        | .29055        | .47942        |

|    |        |        |        |        |        |
|----|--------|--------|--------|--------|--------|
| #1 | 11.057 | 7.2098 | 4.3695 | 1.9773 | 1.7713 |
| #2 | 11.080 | 7.2269 | 4.3861 | 1.9843 | 1.7550 |
| #3 | 11.036 | 7.2641 | 4.4130 | 1.9888 | 1.7672 |

|           |               |               |
|-----------|---------------|---------------|
| Int. Std. | Y_3600        | Y_3710        |
| Units     | Cts/S         | Cts/S         |
| Avg       | <b>54428.</b> | <b>12060.</b> |
| Stddev    | 167.          | 33.           |
| %RSD      | .30660        | .27646        |

|    |        |        |
|----|--------|--------|
| #1 | 54600. | 12086. |
| #2 | 54417. | 12071. |
| #3 | 54267. | 12022. |



Sample Name: ICV005      Acquired: 1/29/2025 15:31:10      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: ICV005      Custom ID2:      Custom ID3:  
Comment:

|        |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|
| Elem   | As1890   | Tl1908   | Pb2203   | Se1960   | Sb2068   | Al3961   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | .9990606 | 1.030469 | .9580774 | .9667031 | 1.001295 | 2.351126 |
| Stddev | .0056953 | .015157  | .0026986 | .0058509 | .002675  | .013824  |
| %RSD   | .5700686 | 1.470855 | .2816683 | .6052408 | .2671288 | .5879655 |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .9931768 | 1.016518 | .9566313 | .9619182 | .998407  | 2.366601 |
| #2 | .9994582 | 1.028293 | .9564101 | .9649650 | 1.001790 | 2.346782 |
| #3 | 1.004547 | 1.046596 | .9611909 | .9732261 | 1.003687 | 2.339997 |

|        |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|
| Elem   | Ba4934   | Be2348   | Cd2144   | Ca3736   | Cr2677   | Co2286   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | .5624476 | .4942479 | .4877198 | 10.05475 | .5347769 | .4888557 |
| Stddev | .0047080 | .0010559 | .0016726 | .07615   | .0026056 | .0017389 |
| %RSD   | .8370527 | .2136484 | .3429412 | .7573965 | .4872352 | .3557094 |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .5669708 | .4935556 | .4864727 | 10.13007 | .5372316 | .4869830 |
| #2 | .5627976 | .4937249 | .4870662 | 10.05638 | .5350562 | .4891647 |
| #3 | .5575744 | .4954633 | .4896205 | 9.97779  | .5320428 | .4904194 |

|        |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|
| Elem   | Cu3247   | Fe2598   | Mn2576   | Mg2790   | Ni2316   | Ag3280   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | .4756728 | 9.288009 | .5515622 | 5.781006 | .4931815 | .2258069 |
| Stddev | .0016367 | .065925  | .0033645 | .020225  | .0006043 | .0013151 |
| %RSD   | .3440858 | .7097891 | .6099988 | .3498502 | .1225252 | .5824196 |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .4738989 | 9.350894 | .5544574 | 5.773981 | .4927347 | .2266075 |
| #2 | .4771244 | 9.293719 | .5523581 | 5.803807 | .4929407 | .2265241 |
| #3 | .4759951 | 9.219415 | .5478711 | 5.765231 | .4938690 | .2242890 |

|        |          |          |          |          |          |            |
|--------|----------|----------|----------|----------|----------|------------|
| Elem   | Na8183   | V_2924   | Zn2138   | K_7698   | P_1774   | B_2496     |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm        |
| Avg    | 10.30212 | .4966874 | .9336785 | 9.526703 | 5.082850 | F .0233640 |
| Stddev | .20224   | .0032236 | .0025832 | .083659  | .022333  | .0010429   |
| %RSD   | 1.963078 | .6490204 | .2766645 | .8781557 | .4393753 | 4.463836   |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | 10.14584 | .5004097 | .9308458 | 9.620429 | 5.068428 | .0236183 |
| #2 | 10.53054 | .4948236 | .9342860 | 9.500102 | 5.071547 | .0242563 |
| #3 | 10.22999 | .4948289 | .9359038 | 9.459579 | 5.108575 | .0222175 |

Sample Name: ICV005      Acquired: 1/29/2025 15:31:10      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: ICV005      Custom ID2:      Custom ID3:  
Comment:

|        |                   |                 |                   |                 |                   |                 |
|--------|-------------------|-----------------|-------------------|-----------------|-------------------|-----------------|
| Elem   | Mo2020            | S_1820          | Si2516            | Sn1899          | Ti3361            | Li6707          |
| Units  | ppm               | ppm             | ppm               | ppm             | ppm               | ppm             |
| Avg    | <b>F -.000211</b> | <b>4.816161</b> | <b>F .0079037</b> | <b>5.398317</b> | <b>F -.001064</b> | <b>4.922811</b> |
| Stddev | .000108           | .015554         | .0045135          | .023326         | .000471           | .037764         |
| %RSD   | 51.00861          | .3229611        | 57.10653          | .4320922        | 44.24065          | .7671158        |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | -.000172 | 4.803261 | .0027166 | 5.379514 | -.000526 | 4.952277 |
| #2 | -.000333 | 4.811789 | .0109362 | 5.391018 | -.001400 | 4.935916 |
| #3 | -.000129 | 4.833434 | .0100582 | 5.424419 | -.001266 | 4.880241 |

|        |                   |
|--------|-------------------|
| Elem   | Sr4077            |
| Units  | ppm               |
| Avg    | <b>F 5.811753</b> |
| Stddev | .103623           |
| %RSD   | 1.782987          |

|    |          |
|----|----------|
| #1 | 5.920689 |
| #2 | 5.714421 |
| #3 | 5.800150 |

|           |                 |                 |                 |                 |                 |
|-----------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Int. Std. | Y_2243          | Y_3600          | Y_3710          | Y_2243          | In2306          |
| Units     | Cts/S           | Cts/S           | Cts/S           | Cts/S           | Cts/S           |
| Avg       | <b>3325.136</b> | <b>70529.07</b> | <b>13423.03</b> | <b>2381.597</b> | <b>3871.476</b> |
| Stddev    | 7.221           | 327.79          | 15.82           | 2.196           | 4.040           |
| %RSD      | .2171694        | .4647642        | .1178380        | .0921933        | .1043572        |

|    |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|
| #1 | 3326.349 | 70187.88 | 13427.61 | 2383.466 | 3872.239 |
| #2 | 3331.673 | 70557.76 | 13436.06 | 2379.179 | 3875.080 |
| #3 | 3317.385 | 70841.59 | 13405.43 | 2382.145 | 3867.109 |

Sample Name: ICB005      Acquired: 1/29/2025 15:35:11      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: ICB005      Custom ID2:      Custom ID3:  
Comment:

|        |          |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|----------|
| Elem   | As1890   | Tl1908   | Pb2203   | Se1960   | Sb2068   | Al3961   | Ba4934   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | .0008439 | -.000321 | .0007344 | -.002516 | -.000155 | -.001415 | .0000541 |
| Stddev | .0021898 | .000949  | .0011468 | .004210  | .000290  | .003860  | .0000561 |
| %RSD   | 259.4984 | 295.3362 | 156.1652 | 167.3286 | 186.8017 | 272.8565 | 103.6724 |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | .0033594 | -.001214 | .0013350 | -.007281 | -.000319 | -.004886 | .0000638 |
| #2 | -.000636 | -.000425 | .0014562 | .000701  | .000180  | -.002100 | .0001048 |
| #3 | -.000192 | .000675  | -.000588 | -.000969 | -.000327 | .002742  | -.000006 |

|        |          |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|----------|
| Elem   | Be2348   | Cd2144   | Ca3736   | Cr2677   | Co2286   | Cu3247   | Fe2598   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | -.000047 | .0000237 | .0106732 | .0000867 | -.000103 | .0001253 | -.003270 |
| Stddev | .000011  | .0001170 | .0047677 | .0002905 | .000109  | .0024832 | .003818  |
| %RSD   | 23.67226 | 494.0466 | 44.66952 | 335.2024 | 105.7496 | 1982.395 | 116.7501 |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | -.000034 | .0001487 | .0160818 | -.000242 | -.000228 | -.002585 | -.005274 |
| #2 | -.000054 | .0000053 | .0088584 | .000310  | -.000062 | .000668  | -.005670 |
| #3 | -.000052 | -.000083 | .0070795 | .000191  | -.000021 | .002292  | .001133  |

|        |          |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|----------|
| Elem   | Mn2576   | Mg2790   | Ni2316   | Ag3280   | Na8183   | V_2924   | Zn2138   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | -.000021 | -.006895 | .0001273 | -.000167 | -.144052 | .0000414 | .0005785 |
| Stddev | .000356  | .010181  | .0005169 | .000292  | .230842  | .0014554 | .0008267 |
| %RSD   | 1714.575 | 147.6590 | 405.9518 | 174.3023 | 160.2497 | 3515.988 | 142.8943 |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | -.000429 | -.011799 | -.000418 | -.000476 | .035190  | -.000545 | -.000331 |
| #2 | .000231  | -.013695 | .000611  | -.000130 | -.404531 | -.001029 | .000783  |
| #3 | .000135  | .004810  | .000189  | .000104  | -.062814 | .001699  | .001284  |

|        |          |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|----------|
| Elem   | K_7698   | P_1774   | B_2496   | Mo2020   | S_1820   | Si2516   | Sn1899   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | .0525499 | -.000401 | .0030494 | -.000082 | .0054814 | .0023781 | -.000119 |
| Stddev | .0211642 | .001618  | .0001381 | .000321  | .0019289 | .0054834 | .000608  |
| %RSD   | 40.27452 | 403.8744 | 4.528450 | 392.1341 | 35.18943 | 230.5779 | 512.1881 |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | .0761911 | -.001458 | .0031523 | -.000001 | .0054477 | -.003186 | .000047  |
| #2 | .0353680 | -.001207 | .0031033 | .000191  | .0074269 | .002544  | -.000792 |
| #3 | .0460906 | .001463  | .0028925 | -.000435 | .0035696 | .007777  | .000389  |

Sample Name: ICB005      Acquired: 1/29/2025 15:35:11      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: ICB005      Custom ID2:      Custom ID3:  
Comment:

|        |          |          |          |
|--------|----------|----------|----------|
| Elem   | Ti3361   | Li6707   | Sr4077   |
| Units  | ppm      | ppm      | ppm      |
| Avg    | .0004056 | -.000064 | .0000905 |
| Stddev | .0011269 | .000188  | .0000491 |
| %RSD   | 277.8177 | 293.0287 | 54.22499 |

|    |          |          |          |
|----|----------|----------|----------|
| #1 | -.000670 | .000137  | .0001469 |
| #2 | .001578  | -.000236 | .0000579 |
| #3 | .000309  | -.000093 | .0000666 |

|           |          |          |          |          |          |
|-----------|----------|----------|----------|----------|----------|
| Int. Std. | Y_2243   | Y_3600   | Y_3710   | Y_2243   | In2306   |
| Units     | Cts/S    | Cts/S    | Cts/S    | Cts/S    | Cts/S    |
| Avg       | 3393.712 | 72569.04 | 13440.39 | 2418.402 | 4126.671 |
| Stddev    | 7.678    | 293.71   | 110.96   | 16.819   | 6.816    |
| %RSD      | .2262274 | .4047375 | .8255761 | .6954544 | .1651643 |

|    |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|
| #1 | 3402.459 | 72235.83 | 13364.41 | 2401.373 | 4128.472 |
| #2 | 3388.089 | 72790.39 | 13389.04 | 2418.831 | 4119.135 |
| #3 | 3390.587 | 72680.91 | 13567.73 | 2435.003 | 4132.405 |

Sample Name: ICSA005      Acquired: 1/29/2025 15:41:14      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: ICSA005      Custom ID2:      Custom ID3:  
Comment:

|        |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|
| Elem   | As1890   | Tl1908   | Pb2203   | Se1960   | Sb2068   | Al3961   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | .0057793 | .0031054 | .0035286 | .0240222 | .0066356 | 224.9548 |
| Stddev | .0027539 | .0023666 | .0001792 | .0061843 | .0004721 | 3.1704   |
| %RSD   | 47.65011 | 76.21014 | 5.079024 | 25.74399 | 7.114860 | 1.409346 |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .0034595 | .0017694 | .0033464 | .0299022 | .0067706 | 228.2456 |
| #2 | .0088227 | .0058379 | .0037047 | .0175730 | .0061106 | 221.9203 |
| #3 | .0050557 | .0017089 | .0035346 | .0245914 | .0070254 | 224.6985 |

|        |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|
| Elem   | Ba4934   | Be2348   | Cd2144   | Ca3736   | Cr2677   | Co2286   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | .0064678 | -.000596 | -.000158 | 238.0932 | .0608726 | .0010856 |
| Stddev | .0010750 | .000043  | .000043  | 1.9821   | .0002750 | .0002135 |
| %RSD   | 16.62037 | 7.227137 | 27.43365 | .8324992 | .4518249 | 19.66436 |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .0071888 | -.000601 | -.000156 | 238.8002 | .0607802 | .0010241 |
| #2 | .0069822 | -.000551 | -.000116 | 235.8545 | .0611819 | .0009096 |
| #3 | .0052322 | -.000636 | -.000203 | 239.6249 | .0606556 | .0013231 |

|        |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|
| Elem   | Cu3247   | Fe2598   | Mn2576   | Mg2790   | Ni2316   | Ag3280   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | -.004185 | 98.33179 | .0186281 | 232.7414 | .0026951 | -.002328 |
| Stddev | .002299  | .70391   | .0003500 | 1.6901   | .0002697 | .000147  |
| %RSD   | 54.93401 | .7158497 | 1.878767 | .7261843 | 10.00791 | 6.310000 |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | -.006718 | 98.54928 | .0188776 | 233.1784 | .0027974 | -.002159 |
| #2 | -.002231 | 97.54480 | .0182280 | 230.8757 | .0028988 | -.002427 |
| #3 | -.003606 | 98.90129 | .0187786 | 234.1701 | .0023892 | -.002397 |

|        |          |          |          |          |          |            |
|--------|----------|----------|----------|----------|----------|------------|
| Elem   | Na8183   | V_2924   | Zn2138   | K_7698   | P_1774   | B_2496     |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm        |
| Avg    | -.163871 | -.004008 | -.008741 | -.075078 | .0009837 | F .1988006 |
| Stddev | .306160  | .003157  | .002605  | .034602  | .0013667 | .0045377   |
| %RSD   | 186.8298 | 78.76847 | 29.80048 | 46.08866 | 138.9333 | 2.282531   |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .094452  | -.001884 | -.005780 | -.113895 | .0025555 | .2001760 |
| #2 | -.502044 | -.002504 | -.010681 | -.047468 | .0003207 | .1937344 |
| #3 | -.084022 | -.007635 | -.009761 | -.063870 | .0000750 | .2024915 |

Sample Name: ICSA005      Acquired: 1/29/2025 15:41:14      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: ICSA005      Custom ID2:      Custom ID3:  
Comment:

|        |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|
| Elem   | Mo2020   | S_1820   | Si2516   | Sn1899   | Ti3361   | Li6707   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | .0000526 | .0214723 | .0056031 | -.004040 | -.002501 | .0055373 |
| Stddev | .0006628 | .0019963 | .0030023 | .001631  | .000569  | .0001267 |
| %RSD   | 1261.067 | 9.297170 | 53.58390 | 40.36887 | 22.74598 | 2.288362 |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .0008146 | .0208924 | .0071832 | -.005146 | -.002144 | .0055050 |
| #2 | -.000390 | .0198301 | .0074853 | -.002167 | -.002202 | .0056770 |
| #3 | -.000267 | .0236943 | .0021406 | -.004806 | -.003157 | .0054298 |

|        |            |
|--------|------------|
| Elem   | Sr4077     |
| Units  | ppm        |
| Avg    | F .1014649 |
| Stddev | .0010411   |
| %RSD   | 1.026091   |

|    |          |
|----|----------|
| #1 | .1019634 |
| #2 | .1002683 |
| #3 | .1021631 |

|           |          |          |          |          |          |
|-----------|----------|----------|----------|----------|----------|
| Int. Std. | Y_2243   | Y_3600   | Y_3710   | Y_2243   | In2306   |
| Units     | Cts/S    | Cts/S    | Cts/S    | Cts/S    | Cts/S    |
| Avg       | 2981.033 | 63412.18 | 13041.63 | 2108.384 | 3300.914 |
| Stddev    | 1.969    | 161.98   | 55.73    | 4.605    | 1.900    |
| %RSD      | .0660349 | .2554350 | .4273333 | .2184351 | .0575587 |

|    |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|
| #1 | 2979.978 | 63405.38 | 13092.11 | 2103.990 | 3302.091 |
| #2 | 2979.817 | 63577.45 | 12981.82 | 2107.987 | 3301.929 |
| #3 | 2983.304 | 63253.71 | 13050.94 | 2113.175 | 3298.722 |

Sample Name: ICSAB005      Acquired: 1/29/2025 15:45:28      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: ICSAB005      Custom ID2:      Custom ID3:  
Comment:

|        |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | As1890          | Tl1908          | Pb2203          | Se1960          | Sb2068          | Al3961          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>.0961105</b> | <b>.0997608</b> | <b>.0534378</b> | <b>.0691383</b> | <b>.5769237</b> | <b>221.9573</b> |
| Stddev | .0022726        | .0008657        | .0019882        | .0028731        | .0034307        | 1.4036          |
| %RSD   | 2.364599        | .8678192        | 3.720643        | 4.155518        | .5946521        | .6323901        |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .0938583 | .1007538 | .0545979 | .0676908 | .5789263 | 223.5775 |
| #2 | .0960702 | .0993645 | .0545735 | .0724473 | .5729624 | 221.1106 |
| #3 | .0984031 | .0991642 | .0511420 | .0672770 | .5788825 | 221.1838 |

|        |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | Ba4934          | Be2348          | Cd2144          | Ca3736          | Cr2677          | Co2286          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>.4952464</b> | <b>.5064060</b> | <b>.9837477</b> | <b>233.8816</b> | <b>.5995154</b> | <b>.4987010</b> |
| Stddev | .0034023        | .0005514        | .0020330        | .8585           | .0004185        | .0008707        |
| %RSD   | .6869919        | .1088958        | .2066597        | .3670596        | .0697983        | .1745897        |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .4981722 | .5060239 | .9822796 | 234.8630 | .5992888 | .4987744 |
| #2 | .4915129 | .5061559 | .9828953 | 233.2698 | .5999982 | .4977960 |
| #3 | .4960540 | .5070382 | .9860681 | 233.5120 | .5992591 | .4995327 |

|        |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | Cu3247          | Fe2598          | Mn2576          | Mg2790          | Ni2316          | Ag3280          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>.4850098</b> | <b>96.74679</b> | <b>.5081471</b> | <b>228.2457</b> | <b>.9955795</b> | <b>.1992657</b> |
| Stddev | .0009009        | .32068          | .0030906        | .7513           | .0010581        | .0003182        |
| %RSD   | .1857529        | .3314584        | .6082092        | .3291826        | .1062760        | .1596633        |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .4843089 | 97.11487 | .5107776 | 228.9942 | .9952975 | .1995533 |
| #2 | .4860259 | 96.59765 | .5047433 | 228.2513 | .9967500 | .1989239 |
| #3 | .4846945 | 96.52784 | .5089206 | 227.4915 | .9946911 | .1993198 |

|        |                 |                 |                 |                 |                 |                   |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-------------------|
| Elem   | Na8183          | V_2924          | Zn2138          | K_7698          | P_1774          | B_2496            |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm               |
| Avg    | <b>-.130691</b> | <b>.4848134</b> | <b>.9584420</b> | <b>-.275210</b> | <b>.0060727</b> | <b>F .1807588</b> |
| Stddev | .171914         | .0022309        | .0047669        | .053868         | .0024190        | .0010988          |
| %RSD   | 131.5423        | .4601478        | .4973539        | 19.57339        | 39.83416        | .6078650          |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | -.308529 | .4860035 | .9557177 | -.217855 | .0080725 | .1819961 |
| #2 | .034613  | .4822399 | .9556620 | -.283042 | .0067618 | .1798969 |
| #3 | -.118157 | .4861970 | .9639462 | -.324733 | .0033840 | .1803835 |

Sample Name: ICSAB005      Acquired: 1/29/2025 15:45:28      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: ICSAB005      Custom ID2:      Custom ID3:  
Comment:

|        |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | Mo2020          | S_1820          | Si2516          | Sn1899          | Ti3361          | Li6707          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>-.000099</b> | <b>.0248077</b> | <b>-.000068</b> | <b>-.003963</b> | <b>-.004674</b> | <b>.0042103</b> |
| Stddev | .000627         | .0037848        | .006270         | .000501         | .000673         | .0008301        |
| %RSD   | 630.7351        | 15.25666        | 9259.927        | 12.64200        | 14.38889        | 19.71552        |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .000071  | .0290348 | .007042  | -.004401 | -.004782 | .0032518 |
| #2 | .000425  | .0217331 | -.002436 | -.004072 | -.005286 | .0046959 |
| #3 | -.000793 | .0236552 | -.004808 | -.003417 | -.003954 | .0046831 |

|        |                 |
|--------|-----------------|
| Elem   | Sr4077          |
| Units  | ppm             |
| Avg    | <b>.0989680</b> |
| Stddev | .0009041        |
| %RSD   | .9135033        |

|    |          |
|----|----------|
| #1 | .0994054 |
| #2 | .0979284 |
| #3 | .0995702 |

|           |                 |                 |                 |                 |                 |
|-----------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Int. Std. | Y_2243          | Y_3600          | Y_3710          | Y_2243          | In2306          |
| Units     | Cts/S           | Cts/S           | Cts/S           | Cts/S           | Cts/S           |
| Avg       | <b>3060.931</b> | <b>63560.55</b> | <b>12878.77</b> | <b>2126.991</b> | <b>3399.128</b> |
| Stddev    | 4.259           | 175.46          | 10.38           | 6.364           | .790            |
| %RSD      | .1391425        | .2760515        | .0806227        | .2991949        | .0232280        |

|    |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|
| #1 | 3056.719 | 63358.31 | 12866.85 | 2122.762 | 3399.403 |
| #2 | 3060.839 | 63651.19 | 12883.57 | 2123.901 | 3398.237 |
| #3 | 3065.236 | 63672.16 | 12885.88 | 2134.310 | 3399.742 |



Sample Name: CCV028      Acquired: 1/29/2025 15:49:33      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: CCV028      Custom ID2:      Custom ID3:  
Comment:

|        |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | As1890          | Tl1908          | Pb2203          | Se1960          | Sb2068          | Al3961          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>5.106231</b> | <b>4.965000</b> | <b>25.16854</b> | <b>5.143835</b> | <b>5.199633</b> | <b>405.4101</b> |
| Stddev | .010631         | .018986         | .03707          | .012946         | .009543         | 2.4661          |
| %RSD   | .2082056        | .3823904        | .1472779        | .2516889        | .1835362        | .6082890        |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | 5.100450 | 4.958127 | 25.14548 | 5.136843 | 5.189592 | 407.8203 |
| #2 | 5.099742 | 4.950407 | 25.14884 | 5.135889 | 5.200722 | 405.5181 |
| #3 | 5.118500 | 4.986465 | 25.21130 | 5.158775 | 5.208585 | 402.8918 |

|        |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | Ba4934          | Be2348          | Cd2144          | Ca3736          | Cr2677          | Co2286          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>10.96322</b> | <b>.5162241</b> | <b>2.555079</b> | <b>413.1468</b> | <b>15.97342</b> | <b>2.560251</b> |
| Stddev | .04592          | .0037606        | .002704         | 2.9092          | .01044          | .001207         |
| %RSD   | .4188510        | .7284796        | .1058365        | .7041452        | .0653500        | .0471285        |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | 10.91069 | .5205648 | 2.552817 | 410.3555 | 15.96209 | 2.559181 |
| #2 | 10.98318 | .5139480 | 2.554345 | 416.1610 | 15.98265 | 2.560014 |
| #3 | 10.99578 | .5141596 | 2.558074 | 412.9240 | 15.97552 | 2.561559 |

|        |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | Cu3247          | Fe2598          | Mn2576          | Mg2790          | Ni2316          | Ag3280          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>15.81434</b> | <b>408.8166</b> | <b>15.97336</b> | <b>409.4044</b> | <b>2.552075</b> | <b>1.334014</b> |
| Stddev | .06592          | 2.0364          | .07254          | 1.5681          | .004292         | .002457         |
| %RSD   | .4168624        | .4981311        | .4541116        | .3830212        | .1681779        | .1842081        |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | 15.78600 | 406.4705 | 15.89142 | 407.5968 | 2.548284 | 1.335790 |
| #2 | 15.76732 | 410.1271 | 15.99928 | 410.3993 | 2.551207 | 1.335043 |
| #3 | 15.88969 | 409.8522 | 16.02937 | 410.2171 | 2.556735 | 1.331210 |

|        |                 |                 |                 |                 |                 |                   |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-------------------|
| Elem   | Na8183          | V_2924          | Zn2138          | K_7698          | P_1774          | B_2496            |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm               |
| Avg    | <b>413.6875</b> | <b>2.580286</b> | <b>16.04027</b> | <b>163.7206</b> | <b>5.142794</b> | <b>F 5.572764</b> |
| Stddev | 1.7070          | .004600         | .04001          | 1.0645          | .029720         | .024418           |
| %RSD   | .4126215        | .1782628        | .2494656        | .6501640        | .5778934        | .4381713          |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | 413.5458 | 2.584060 | 16.01520 | 162.4936 | 5.118302 | 5.600787 |
| #2 | 412.0559 | 2.575163 | 16.01920 | 164.2728 | 5.134222 | 5.561452 |
| #3 | 415.4609 | 2.581635 | 16.08642 | 164.3956 | 5.175858 | 5.556054 |

Sample Name: CCV028      Acquired: 1/29/2025 15:49:33      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: CCV028      Custom ID2:      Custom ID3:  
Comment:

|        |          |          |            |          |          |          |
|--------|----------|----------|------------|----------|----------|----------|
| Elem   | Mo2020   | S_1820   | Si2516     | Sn1899   | Ti3361   | Li6707   |
| Units  | ppm      | ppm      | ppm        | ppm      | ppm      | ppm      |
| Avg    | 5.079681 | 5.189158 | F 6.514212 | 5.093894 | 5.200003 | 5.453585 |
| Stddev | .011658  | .004821  | .031187    | .011251  | .010499  | .049589  |
| %RSD   | .2294998 | .0929026 | .4787575   | .2208815 | .2019104 | .9092995 |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | 5.069662 | 5.185065 | 6.539903 | 5.089401 | 5.189865 | 5.397660 |
| #2 | 5.076905 | 5.187936 | 6.479512 | 5.085583 | 5.199314 | 5.470897 |
| #3 | 5.092476 | 5.194472 | 6.523220 | 5.106698 | 5.210830 | 5.492198 |

|        |            |
|--------|------------|
| Elem   | Sr4077     |
| Units  | ppm        |
| Avg    | F 5.626155 |
| Stddev | .053139    |
| %RSD   | .9445042   |

|    |          |
|----|----------|
| #1 | 5.620416 |
| #2 | 5.681931 |
| #3 | 5.576118 |

|           |          |          |          |          |          |
|-----------|----------|----------|----------|----------|----------|
| Int. Std. | Y_2243   | Y_3600   | Y_3710   | Y_2243   | In2306   |
| Units     | Cts/S    | Cts/S    | Cts/S    | Cts/S    | Cts/S    |
| Avg       | 2765.010 | 59820.67 | 12488.23 | 1964.820 | 2975.489 |
| Stddev    | 10.066   | 116.39   | 76.25    | 2.988    | 7.762    |
| %RSD      | .3640601 | .1945701 | .6105773 | .1520658 | .2608737 |

|    |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|
| #1 | 2776.293 | 59878.95 | 12402.70 | 1961.371 | 2984.088 |
| #2 | 2761.786 | 59686.65 | 12512.92 | 1966.447 | 2973.378 |
| #3 | 2756.950 | 59896.40 | 12549.08 | 1966.641 | 2969.000 |

Sample Name: CCB028      Acquired: 1/29/2025 15:53:51      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: CCB028      Custom ID2:      Custom ID3:  
Comment:

|        |          |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|----------|
| Elem   | As1890   | Tl1908   | Pb2203   | Se1960   | Sb2068   | Al3961   | Ba4934   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | .0021815 | .0018599 | .0007598 | .0014983 | -.000514 | .0093605 | .0005395 |
| Stddev | .0015411 | .0014459 | .0012506 | .0020784 | .002103  | .0044132 | .0001797 |
| %RSD   | 70.64563 | 77.73949 | 164.5853 | 138.7185 | 408.9715 | 47.14682 | 33.30148 |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | .0008758 | .0034347 | .0022035 | .0036248 | -.000164 | .0045335 | .0004947 |
| #2 | .0017872 | .0015528 | .0000632 | .0013983 | .001392  | .0131887 | .0003865 |
| #3 | .0038815 | .0005923 | .0000127 | -.000528 | -.002770 | .0103594 | .0007373 |

|        |          |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|----------|
| Elem   | Be2348   | Cd2144   | Ca3736   | Cr2677   | Co2286   | Cu3247   | Fe2598   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | -.000049 | .0000394 | .0122853 | .0001827 | .0000156 | -.001537 | .0076877 |
| Stddev | .000054  | .0000379 | .0068434 | .0002331 | .0002706 | .000535  | .0034188 |
| %RSD   | 110.6052 | 95.96721 | 55.70414 | 127.5489 | 1737.221 | 34.78844 | 44.47054 |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | -.000015 | .0000483 | .0056074 | .0002769 | -.000166 | -.001048 | .0092253 |
| #2 | -.000111 | -.000002 | .0192831 | -.000083 | -.000114 | -.002108 | .0037701 |
| #3 | -.000021 | .000072  | .0119655 | .000354  | .000327  | -.001455 | .0100677 |

|        |          |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|----------|
| Elem   | Mn2576   | Mg2790   | Ni2316   | Ag3280   | Na8183   | V_2924   | Zn2138   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | .0001270 | .0188466 | -.000175 | .0000214 | .0299063 | .0011106 | .0000325 |
| Stddev | .0002549 | .0078177 | .000296  | .0001196 | .2377015 | .0006864 | .0006413 |
| %RSD   | 200.6651 | 41.48047 | 169.2967 | 559.3378 | 794.8215 | 61.80556 | 1971.023 |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | -.000148 | .0208362 | -.000278 | .0001489 | -.197814 | .0016400 | -.000373 |
| #2 | .000173  | .0254773 | -.000406 | .0000035 | .276467  | .0003351 | -.000301 |
| #3 | .000356  | .0102264 | .000159  | -.000088 | .011066  | .0013568 | .000772  |

|        |          |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|----------|
| Elem   | K_7698   | P_1774   | B_2496   | Mo2020   | S_1820   | Si2516   | Sn1899   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | .0942873 | -.001280 | .0054925 | .0000876 | .0059609 | .0014401 | -.000191 |
| Stddev | .0278586 | .000792  | .0003645 | .0001493 | .0037390 | .0038794 | .000380  |
| %RSD   | 29.54654 | 61.85363 | 6.636351 | 170.4256 | 62.72598 | 269.3851 | 198.8116 |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | .1020913 | -.002075 | .0053288 | .0002389 | .0039164 | .0059191 | .000015  |
| #2 | .1174116 | -.001273 | .0052384 | .0000836 | .0036899 | -.000741 | -.000629 |
| #3 | .0633589 | -.000492 | .0059101 | -.000060 | .0102763 | -.000858 | .000041  |

Sample Name: CCB028      Acquired: 1/29/2025 15:53:51      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: CCB028      Custom ID2:      Custom ID3:  
Comment:

|        |          |          |          |
|--------|----------|----------|----------|
| Elem   | Ti3361   | Li6707   | Sr4077   |
| Units  | ppm      | ppm      | ppm      |
| Avg    | .0008864 | .0007086 | .0000882 |
| Stddev | .0003290 | .0009410 | .0000880 |
| %RSD   | 37.11425 | 132.8057 | 99.76392 |

|    |          |          |          |
|----|----------|----------|----------|
| #1 | .0011328 | .0001854 | -.000013 |
| #2 | .0005128 | .0017950 | .000129  |
| #3 | .0010134 | .0001454 | .000149  |

|           |          |          |          |          |          |
|-----------|----------|----------|----------|----------|----------|
| Int. Std. | Y_2243   | Y_3600   | Y_3710   | Y_2243   | In2306   |
| Units     | Cts/S    | Cts/S    | Cts/S    | Cts/S    | Cts/S    |
| Avg       | 3378.218 | 72622.83 | 13529.11 | 2431.064 | 4091.355 |
| Stddev    | 6.574    | 274.68   | 88.17    | 5.183    | 2.454    |
| %RSD      | .1946130 | .3782274 | .6516734 | .2131896 | .0599864 |

|    |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|
| #1 | 3373.962 | 72703.06 | 13585.01 | 2436.862 | 4089.090 |
| #2 | 3385.790 | 72848.46 | 13427.48 | 2429.451 | 4093.963 |
| #3 | 3374.902 | 72316.97 | 13574.86 | 2426.880 | 4091.012 |

Sample Name: Q1136-02      Acquired: 1/29/2025 15:58:00      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: YE8F7      Custom ID2:      Custom ID3:  
Comment:

|        |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|
| Elem   | As1890   | Tl1908   | Pb2203   | Se1960   | Sb2068   | Al3961   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | .0153133 | .0029970 | .0050894 | -.004850 | -.002604 | 31.07541 |
| Stddev | .0008638 | .0017222 | .0012616 | .000060  | .000248  | .10745   |
| %RSD   | 5.640586 | 57.46476 | 24.78902 | 1.230892 | 9.521662 | .3457558 |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .0161779 | .0010444 | .0051716 | -.004783 | -.002715 | 31.08915 |
| #2 | .0153117 | .0042999 | .0063079 | -.004869 | -.002778 | 30.96175 |
| #3 | .0144504 | .0036466 | .0037887 | -.004898 | -.002320 | 31.17532 |

|        |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|
| Elem   | Ba4934   | Be2348   | Cd2144   | Ca3736   | Cr2677   | Co2286   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | .0376117 | .0025540 | .0015093 | 51.17705 | .0297309 | .1126255 |
| Stddev | .0005110 | .0000205 | .0001048 | .07150   | .0000738 | .0003275 |
| %RSD   | 1.358590 | .8022116 | 6.946504 | .1397019 | .2481043 | .2907949 |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .0381876 | .0025642 | .0016170 | 51.23373 | .0296666 | .1129624 |
| #2 | .0374347 | .0025304 | .0014075 | 51.09673 | .0297146 | .1123083 |
| #3 | .0372127 | .0025674 | .0015034 | 51.20069 | .0298114 | .1126057 |

|        |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|
| Elem   | Cu3247   | Fe2598   | Mn2576   | Mg2790   | Ni2316   | Ag3280   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | .1197466 | 11.58207 | 2.282116 | 23.18116 | .1059449 | -.002937 |
| Stddev | .0007050 | .02877   | .005575  | .04572   | .0003199 | .000158  |
| %RSD   | .5887161 | .2484325 | .2442992 | .1972140 | .3019291 | 5.393663 |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .1193918 | 11.57855 | 2.287318 | 23.20380 | .1055756 | -.002796 |
| #2 | .1192895 | 11.55522 | 2.276231 | 23.12854 | .1061287 | -.002907 |
| #3 | .1205585 | 11.61244 | 2.282800 | 23.21113 | .1061305 | -.003108 |

|        |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|
| Elem   | Na8183   | V_2924   | Zn2138   | K_7698   | P_1774   | B_2496   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | 2.760222 | .0243054 | .5084607 | 12.91822 | .6329755 | .2887731 |
| Stddev | .152769  | .0003075 | .0030588 | .03776   | .0045437 | .0010080 |
| %RSD   | 5.534660 | 1.265106 | .6015760 | .2922817 | .7178296 | .3490448 |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | 2.715903 | .0239516 | .5089764 | 12.93361 | .6381013 | .2886267 |
| #2 | 2.930250 | .0245082 | .5051768 | 12.87520 | .6294430 | .2898463 |
| #3 | 2.634512 | .0244564 | .5112288 | 12.94586 | .6313823 | .2878465 |

Sample Name: Q1136-02      Acquired: 1/29/2025 15:58:00      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: YE8F7      Custom ID2:      Custom ID3:  
Comment:

|        |          |            |            |          |          |          |
|--------|----------|------------|------------|----------|----------|----------|
| Elem   | Mo2020   | S_1820     | Si2516     | Sn1899   | Ti3361   | Li6707   |
| Units  | ppm      | ppm        | ppm        | ppm      | ppm      | ppm      |
| Avg    | .0000959 | F 327.8339 | F 21.18949 | -.002491 | .0109164 | .0249730 |
| Stddev | .0001848 | .2513      | .03463     | .000242  | .0001648 | .0003093 |
| %RSD   | 192.7179 | .0766552   | .1634198   | 9.713579 | 1.509276 | 1.238672 |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .0001423 | 328.0892 | 21.22934 | -.002574 | .0110841 | .0249078 |
| #2 | .0002531 | 327.5868 | 21.17240 | -.002680 | .0107548 | .0253097 |
| #3 | -.000108 | 327.8259 | 21.16673 | -.002218 | .0109101 | .0247014 |

|        |          |
|--------|----------|
| Elem   | Sr4077   |
| Units  | ppm      |
| Avg    | .2956309 |
| Stddev | .0011462 |
| %RSD   | .3877199 |

|    |          |
|----|----------|
| #1 | .2968437 |
| #2 | .2945655 |
| #3 | .2954835 |

|           |          |          |          |          |          |
|-----------|----------|----------|----------|----------|----------|
| Int. Std. | Y_2243   | Y_3600   | Y_3710   | Y_2243   | In2306   |
| Units     | Cts/S    | Cts/S    | Cts/S    | Cts/S    | Cts/S    |
| Avg       | 7298.725 | 157105.9 | 30320.25 | 5243.303 | 3738.736 |
| Stddev    | 21.600   | 483.2    | 68.46    | 24.317   | 9.181    |
| %RSD      | .2959405 | .3075347 | .2257933 | .4637800 | .2455701 |

|    |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|
| #1 | 7318.782 | 157255.4 | 30387.55 | 5264.027 | 3745.154 |
| #2 | 7301.535 | 157496.7 | 30322.50 | 5249.350 | 3742.834 |
| #3 | 7275.857 | 156565.7 | 30250.69 | 5216.533 | 3728.219 |

Sample Name: Q1136-03      Acquired: 1/29/2025 16:01:59      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: YE8F7D      Custom ID2:      Custom ID3:  
Comment:

|        |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|
| Elem   | As1890   | Tl1908   | Pb2203   | Se1960   | Sb2068   | Al3961   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | .0149272 | .0032718 | .0070963 | -.003786 | -.002895 | 31.30768 |
| Stddev | .0009618 | .0015072 | .0019157 | .000605  | .000462  | .14055   |
| %RSD   | 6.443632 | 46.06613 | 26.99612 | 15.98667 | 15.95944 | .4489219 |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .0144294 | .0015348 | .0067492 | -.003798 | -.003168 | 31.17539 |
| #2 | .0160359 | .0042336 | .0091618 | -.003175 | -.003156 | 31.29242 |
| #3 | .0143162 | .0040469 | .0053778 | -.004386 | -.002362 | 31.45524 |

|        |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|
| Elem   | Ba4934   | Be2348   | Cd2144   | Ca3736   | Cr2677   | Co2286   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | .0364753 | .0025335 | .0015179 | 50.81248 | .0295408 | .1117600 |
| Stddev | .0010216 | .0000216 | .0000825 | .08176   | .0001014 | .0003118 |
| %RSD   | 2.800825 | .8520933 | 5.434208 | .1609079 | .3434048 | .2790062 |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .0355097 | .0025573 | .0014910 | 50.74527 | .0296577 | .1117868 |
| #2 | .0363713 | .0025152 | .0016105 | 50.78866 | .0294883 | .1114357 |
| #3 | .0375449 | .0025280 | .0014522 | 50.90350 | .0294764 | .1120576 |

|        |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|
| Elem   | Cu3247   | Fe2598   | Mn2576   | Mg2790   | Ni2316   | Ag3280   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | .1189654 | 11.59444 | 2.251447 | 22.90463 | .1052959 | -.002762 |
| Stddev | .0015697 | .04338   | .004841  | .03677   | .0005193 | .000085  |
| %RSD   | 1.319434 | .3741176 | .2150268 | .1605567 | .4931894 | 3.074794 |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .1174930 | 11.56680 | 2.246257 | 22.93887 | .1050470 | -.002751 |
| #2 | .1187863 | 11.57209 | 2.252243 | 22.86576 | .1049478 | -.002852 |
| #3 | .1206169 | 11.64444 | 2.255841 | 22.90928 | .1058928 | -.002683 |

|        |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|
| Elem   | Na8183   | V_2924   | Zn2138   | K_7698   | P_1774   | B_2496   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | 2.848472 | .0242785 | .5118017 | 13.08315 | .6237633 | .2879888 |
| Stddev | .074559  | .0015884 | .0025901 | .06596   | .0030243 | .0011064 |
| %RSD   | 2.617510 | 6.542573 | .5060828 | .5041934 | .4848414 | .3841724 |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | 2.815819 | .0252612 | .5121112 | 13.02814 | .6271609 | .2889830 |
| #2 | 2.795809 | .0224460 | .5090707 | 13.06504 | .6213655 | .2881864 |
| #3 | 2.933786 | .0251285 | .5142232 | 13.15628 | .6227636 | .2867969 |

Sample Name: Q1136-03      Acquired: 1/29/2025 16:01:59      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: YE8F7D      Custom ID2:      Custom ID3:  
Comment:

|        |          |            |            |          |          |          |
|--------|----------|------------|------------|----------|----------|----------|
| Elem   | Mo2020   | S_1820     | Si2516     | Sn1899   | Ti3361   | Li6707   |
| Units  | ppm      | ppm        | ppm        | ppm      | ppm      | ppm      |
| Avg    | .0003053 | F 326.7778 | F 20.83910 | -.002469 | .0109334 | .0251447 |
| Stddev | .0000675 | .6466      | .07977     | .001901  | .0001683 | .0003497 |
| %RSD   | 22.11984 | .1978731   | .3827689   | 77.00483 | 1.539126 | 1.390761 |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .0002705 | 326.4483 | 20.91744 | -.000331 | .0110220 | .0249111 |
| #2 | .0002623 | 326.3624 | 20.84188 | -.003106 | .0110389 | .0255468 |
| #3 | .0003832 | 327.5228 | 20.75798 | -.003970 | .0107393 | .0249762 |

|        |          |
|--------|----------|
| Elem   | Sr4077   |
| Units  | ppm      |
| Avg    | .2952264 |
| Stddev | .0015225 |
| %RSD   | .5156879 |

|    |          |
|----|----------|
| #1 | .2936512 |
| #2 | .2953380 |
| #3 | .2966899 |

|           |          |          |          |          |          |
|-----------|----------|----------|----------|----------|----------|
| Int. Std. | Y_2243   | Y_3600   | Y_3710   | Y_2243   | In2306   |
| Units     | Cts/S    | Cts/S    | Cts/S    | Cts/S    | Cts/S    |
| Avg       | 7197.481 | 156152.3 | 30316.68 | 5122.422 | 3715.663 |
| Stddev    | 36.309   | 325.9    | 159.93   | 13.121   | 22.096   |
| %RSD      | .5044623 | .2086812 | .5275394 | .2561576 | .5946698 |

|    |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|
| #1 | 7234.744 | 156399.5 | 30221.48 | 5134.005 | 3738.077 |
| #2 | 7195.489 | 155783.0 | 30227.24 | 5108.172 | 3715.013 |
| #3 | 7162.209 | 156274.2 | 30501.32 | 5125.091 | 3693.899 |



Sample Name: Q1136-02LX5      Acquired: 1/29/2025 16:05:57      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: YE8F7L      Custom ID2:      Custom ID3:  
Comment:

|        |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|
| Elem   | As1890   | Tl1908   | Pb2203   | Se1960   | Sb2068   | Al3961   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | .0061721 | .0013295 | .0038430 | -.002684 | -.000690 | 11.10259 |
| Stddev | .0006695 | .0003954 | .0014811 | .001827  | .000437  | .04356   |
| %RSD   | 10.84813 | 29.74264 | 38.53986 | 68.04523 | 63.39449 | .3922986 |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .0069044 | .0016513 | .0034357 | -.000766 | -.001058 | 11.09307 |
| #2 | .0055912 | .0008881 | .0026082 | -.004403 | -.000206 | 11.06459 |
| #3 | .0060206 | .0014491 | .0054852 | -.002884 | -.000806 | 11.15012 |

|        |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|
| Elem   | Ba4934   | Be2348   | Cd2144   | Ca3736   | Cr2677   | Co2286   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | .0119751 | .0009296 | .0004155 | 18.25253 | .0116935 | .0227015 |
| Stddev | .0007946 | .0000064 | .0000623 | .04910   | .0002355 | .0001950 |
| %RSD   | 6.635218 | .6913535 | 15.00337 | .2690193 | 2.013568 | .8587945 |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .0117074 | .0009339 | .0003974 | 18.22891 | .0115317 | .0228370 |
| #2 | .0128689 | .0009328 | .0003642 | 18.21970 | .0119636 | .0227895 |
| #3 | .0113490 | .0009223 | .0004849 | 18.30898 | .0115852 | .0224781 |

|        |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|
| Elem   | Cu3247   | Fe2598   | Mn2576   | Mg2790   | Ni2316   | Ag3280   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | .0446559 | 4.242455 | .8238035 | 8.166453 | .0215420 | -.000996 |
| Stddev | .0018919 | .019698  | .0048790 | .020418  | .0000995 | .000128  |
| %RSD   | 4.236591 | .4643127 | .5922527 | .2500280 | .4617918 | 12.89933 |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .0466005 | 4.230366 | .8213893 | 8.148675 | .0214383 | -.000948 |
| #2 | .0445456 | 4.231815 | .8206023 | 8.161932 | .0215512 | -.000898 |
| #3 | .0428215 | 4.265185 | .8294189 | 8.188754 | .0216366 | -.001141 |

|        |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|
| Elem   | Na8183   | V_2924   | Zn2138   | K_7698   | P_1774   | B_2496   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | 1.046580 | .0091656 | .1801557 | 4.475365 | .1364607 | .1090021 |
| Stddev | .155505  | .0009035 | .0021409 | .002441  | .0009777 | .0005437 |
| %RSD   | 14.85844 | 9.857839 | 1.188335 | .0545429 | .7164661 | .4987660 |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .883211  | .0084397 | .1776895 | 4.475961 | .1367621 | .1096289 |
| #2 | 1.063728 | .0088796 | .1815352 | 4.472681 | .1353678 | .1087179 |
| #3 | 1.192800 | .0101775 | .1812425 | 4.477453 | .1372523 | .1086594 |

Sample Name: Q1136-02LX5      Acquired: 1/29/2025 16:05:57      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: YE8F7L      Custom ID2:      Custom ID3:  
Comment:

|        |          |            |          |          |          |          |
|--------|----------|------------|----------|----------|----------|----------|
| Elem   | Mo2020   | S_1820     | Si2516   | Sn1899   | Ti3361   | Li6707   |
| Units  | ppm      | ppm        | ppm      | ppm      | ppm      | ppm      |
| Avg    | .0004150 | F 65.46945 | 7.650868 | -.001098 | .0045245 | .0091357 |
| Stddev | .0002212 | .19812     | .009348  | .000158  | .0006532 | .0002352 |
| %RSD   | 53.30526 | .3026197   | .1221822 | 14.37452 | 14.43676 | 2.574038 |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .0006705 | 65.57182 | 7.650619 | -.001048 | .0046697 | .0091668 |
| #2 | .0002888 | 65.24108 | 7.660338 | -.000971 | .0050929 | .0088865 |
| #3 | .0002858 | 65.59544 | 7.641647 | -.001274 | .0038109 | .0093537 |

|        |          |
|--------|----------|
| Elem   | Sr4077   |
| Units  | ppm      |
| Avg    | .1053583 |
| Stddev | .0004823 |
| %RSD   | .4577392 |

|    |          |
|----|----------|
| #1 | .1051716 |
| #2 | .1049972 |
| #3 | .1059060 |

|           |          |          |          |          |          |
|-----------|----------|----------|----------|----------|----------|
| Int. Std. | Y_2243   | Y_3600   | Y_3710   | Y_2243   | In2306   |
| Units     | Cts/S    | Cts/S    | Cts/S    | Cts/S    | Cts/S    |
| Avg       | 4192.431 | 89840.93 | 16965.68 | 2967.726 | 3995.087 |
| Stddev    | 3.990    | 186.88   | 118.67   | 6.688    | 7.268    |
| %RSD      | .0951708 | .2080155 | .6994732 | .2253432 | .1819133 |

|    |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|
| #1 | 4190.027 | 89852.77 | 16930.43 | 2975.425 | 3986.966 |
| #2 | 4197.037 | 89648.41 | 16868.64 | 2963.364 | 4000.979 |
| #3 | 4190.229 | 90021.62 | 17097.99 | 2964.388 | 3997.315 |

Sample Name: Q1136-04      Acquired: 1/29/2025 16:09:59      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: YE8F7S      Custom ID2:      Custom ID3:  
Comment:

|        |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | As1890          | Tl1908          | Pb2203          | Se1960          | Sb2068          | Al3961          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>.0503951</b> | <b>.0788905</b> | <b>.0528370</b> | <b>.0878469</b> | <b>.0852065</b> | <b>33.69555</b> |
| Stddev | .0020990        | .0033333        | .0005532        | .0015460        | .0012385        | .13352          |
| %RSD   | 4.165072        | 4.225251        | 1.046969        | 1.759871        | 1.453570        | .3962497        |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .0509426 | .0754483 | .0522556 | .0892855 | .0841948 | 33.54860 |
| #2 | .0521662 | .0791202 | .0533568 | .0862122 | .0848369 | 33.72861 |
| #3 | .0480766 | .0821031 | .0528987 | .0880429 | .0865877 | 33.80943 |

|        |                 |                 |                 |                 |                |                 |
|--------|-----------------|-----------------|-----------------|-----------------|----------------|-----------------|
| Elem   | Ba4934          | Be2348          | Cd2144          | Ca3736          | Cr2677         | Co2286          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm            | ppm             |
| Avg    | <b>1.786568</b> | <b>.0478759</b> | <b>.1012649</b> | <b>52.60154</b> | <b>.222327</b> | <b>1.081557</b> |
| Stddev | .013017         | .0001202        | .0007390        | .18485          | .0006263       | .005445         |
| %RSD   | .7285971        | .2510283        | .7297388        | .3514224        | .2818266       | .5034723        |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | 1.771738 | .0479500 | .1008581 | 52.39379 | .2215115 | 1.078779 |
| #2 | 1.796104 | .0479404 | .1008187 | 52.66296 | .2226400 | 1.078061 |
| #3 | 1.791860 | .0477372 | .1021179 | 52.74786 | .2225466 | 1.087832 |

|        |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | Cu3247          | Fe2598          | Mn2576          | Mg2790          | Ni2316          | Ag3280          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>.3451935</b> | <b>12.81183</b> | <b>2.794195</b> | <b>23.79175</b> | <b>1.085772</b> | <b>.0319151</b> |
| Stddev | .0029502        | .03023          | .012826         | .05095          | .004212         | .0001450        |
| %RSD   | .8546506        | .2359310        | .4590310        | .2141391        | .3879615        | .4543657        |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .3431578 | 12.77943 | 2.779614 | 23.73412 | 1.082909 | .0317798 |
| #2 | .3438458 | 12.81680 | 2.799237 | 23.81034 | 1.083799 | .0320682 |
| #3 | .3485768 | 12.83927 | 2.803735 | 23.83080 | 1.090609 | .0318971 |

|        |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | Na8183          | V_2924          | Zn2138          | K_7698          | P_1774          | B_2496          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>2.856198</b> | <b>.4676936</b> | <b>.9527194</b> | <b>13.34606</b> | <b>.6743956</b> | <b>.2857381</b> |
| Stddev | .022757         | .0006586        | .0089259        | .06035          | .0052642        | .0006667        |
| %RSD   | .7967443        | .1408244        | .9368852        | .4522016        | .7805743        | .2333327        |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | 2.879033 | .4680049 | .9426588 | 13.29855 | .6731765 | .2862509 |
| #2 | 2.856041 | .4681388 | .9596885 | 13.41396 | .6698479 | .2859790 |
| #3 | 2.833521 | .4669370 | .9558109 | 13.32566 | .6801623 | .2849844 |

Sample Name: Q1136-04      Acquired: 1/29/2025 16:09:59      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: YE8F7S      Custom ID2:      Custom ID3:  
Comment:

|        |          |            |            |          |          |          |
|--------|----------|------------|------------|----------|----------|----------|
| Elem   | Mo2020   | S_1820     | Si2516     | Sn1899   | Ti3361   | Li6707   |
| Units  | ppm      | ppm        | ppm        | ppm      | ppm      | ppm      |
| Avg    | .0006431 | F 314.0590 | F 21.18055 | -.000418 | .0104394 | .0268924 |
| Stddev | .0001279 | 1.1677     | .03381     | .001539  | .0000316 | .0003294 |
| %RSD   | 19.88574 | .3718147   | .1596080   | 368.4065 | .3030824 | 1.224809 |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .0006101 | 313.4582 | 21.16184 | -.000520 | .0104257 | .0265673 |
| #2 | .0005349 | 313.3140 | 21.21957 | .001170  | .0104168 | .0272259 |
| #3 | .0007842 | 315.4048 | 21.16023 | -.001903 | .0104755 | .0268841 |

|        |          |
|--------|----------|
| Elem   | Sr4077   |
| Units  | ppm      |
| Avg    | .3089301 |
| Stddev | .0018101 |
| %RSD   | .5859130 |

|    |          |
|----|----------|
| #1 | .3068559 |
| #2 | .3101898 |
| #3 | .3097446 |

|           |          |          |          |          |          |
|-----------|----------|----------|----------|----------|----------|
| Int. Std. | Y_2243   | Y_3600   | Y_3710   | Y_2243   | In2306   |
| Units     | Cts/S    | Cts/S    | Cts/S    | Cts/S    | Cts/S    |
| Avg       | 7354.686 | 155649.6 | 30987.77 | 5177.977 | 3815.781 |
| Stddev    | 27.974   | 588.6    | 31.97    | 27.038   | 21.359   |
| %RSD      | .3803505 | .3781564 | .1031750 | .5221789 | .5597462 |

|    |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|
| #1 | 7386.862 | 156274.3 | 30987.09 | 5208.907 | 3836.598 |
| #2 | 7341.058 | 155569.1 | 31020.08 | 5166.200 | 3816.826 |
| #3 | 7336.138 | 155105.3 | 30956.15 | 5158.825 | 3793.919 |

Sample Name: Q1151-01DLX20      Acquired: 1/29/2025 16:13:53      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: MC0AZ0      Custom ID2:      Custom ID3:  
Comment:

|        |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|
| Elem   | As1890   | Tl1908   | Pb2203   | Se1960   | Sb2068   | Al3961   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | .0317233 | .0187045 | .1073728 | .0132739 | .0490555 | .7271002 |
| Stddev | .0005279 | .0003207 | .0009819 | .0021647 | .0026300 | .0081165 |
| %RSD   | 1.664013 | 1.714738 | .9144672 | 16.30763 | 5.361205 | 1.116286 |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .0320988 | .0187048 | .1074132 | .0142570 | .0470749 | .7185702 |
| #2 | .0319514 | .0190251 | .1063713 | .0107921 | .0480520 | .7347279 |
| #3 | .0311198 | .0183837 | .1083338 | .0147725 | .0520394 | .7280024 |

|        |          |          |          |          |          |            |
|--------|----------|----------|----------|----------|----------|------------|
| Elem   | Ba4934   | Be2348   | Cd2144   | Ca3736   | Cr2677   | Co2286     |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm        |
| Avg    | .0160429 | .0008033 | .0003438 | 4.292522 | 25.61671 | F 6.133567 |
| Stddev | .0001850 | .0000815 | .0000623 | .018369  | .08224   | .023482    |
| %RSD   | 1.153119 | 10.14729 | 18.12453 | .4279361 | .3210401 | .3828408   |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .0160358 | .0007656 | .0002829 | 4.273792 | 25.65887 | 6.124181 |
| #2 | .0158616 | .0007475 | .0003410 | 4.310508 | 25.52194 | 6.116230 |
| #3 | .0162314 | .0008969 | .0004074 | 4.293265 | 25.66932 | 6.160290 |

|        |          |          |          |          |            |          |
|--------|----------|----------|----------|----------|------------|----------|
| Elem   | Cu3247   | Fe2598   | Mn2576   | Mg2790   | Ni2316     | Ag3280   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm        | ppm      |
| Avg    | .1667054 | 6.800204 | .1110795 | .6277432 | F 5.186416 | .0003535 |
| Stddev | .0017333 | .047832  | .0008056 | .0130387 | .017616    | .0002216 |
| %RSD   | 1.039722 | .7033941 | .7252033 | 2.077078 | .3396648   | 62.69897 |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .1653690 | 6.765114 | .1103948 | .6211309 | 5.179465 | .0006082 |
| #2 | .1686638 | 6.854687 | .1108766 | .6427633 | 5.173336 | .0002481 |
| #3 | .1660833 | 6.780810 | .1119671 | .6193354 | 5.206448 | .0002043 |

|        |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|
| Elem   | Na8183   | V_2924   | Zn2138   | K_7698   | P_1774   | B_2496   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | 1.941499 | .1137196 | .1873524 | .0050285 | .1364766 | .0502275 |
| Stddev | .205327  | .0016990 | .0033557 | .0372403 | .0011344 | .0007821 |
| %RSD   | 10.57572 | 1.494004 | 1.791090 | 740.5798 | .8312144 | 1.557149 |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | 1.897932 | .1138181 | .1849497 | .0337766 | .1351923 | .0510228 |
| #2 | 2.165113 | .1119735 | .1911864 | -.037040 | .1368956 | .0494593 |
| #3 | 1.761451 | .1153672 | .1859212 | .018349  | .1373419 | .0502005 |

Sample Name: Q1151-01DLX20      Acquired: 1/29/2025 16:13:53      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: MC0AZ0      Custom ID2:      Custom ID3:  
Comment:

|        |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | Mo2020          | S_1820          | Si2516          | Sn1899          | Ti3361          | Li6707          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>3.177277</b> | <b>8.135086</b> | <b>.4162888</b> | <b>.0161244</b> | <b>.0198408</b> | <b>-.000002</b> |
| Stddev | .012342         | .024440         | .0050137        | .0001724        | .0004357        | .000137         |
| %RSD   | .3884370        | .3004303        | 1.204378        | 1.069250        | 2.196207        | 6809.203        |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | 3.172255 | 8.128730 | .4154840 | .0162942 | .0193721 | .000156  |
| #2 | 3.168238 | 8.114452 | .4117262 | .0159495 | .0202335 | -.000090 |
| #3 | 3.191338 | 8.162077 | .4216563 | .0161295 | .0199169 | -.000073 |

|        |                 |
|--------|-----------------|
| Elem   | Sr4077          |
| Units  | ppm             |
| Avg    | <b>.0408825</b> |
| Stddev | .0001139        |
| %RSD   | .2786286        |

|    |          |
|----|----------|
| #1 | .0407904 |
| #2 | .0410099 |
| #3 | .0408472 |

|           |                 |                 |                 |                 |                 |
|-----------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Int. Std. | Y_2243          | Y_3600          | Y_3710          | Y_2243          | In2306          |
| Units     | Cts/S           | Cts/S           | Cts/S           | Cts/S           | Cts/S           |
| Avg       | <b>3339.428</b> | <b>71791.36</b> | <b>13491.01</b> | <b>2379.898</b> | <b>4156.673</b> |
| Stddev    | 8.951           | 72.42           | 72.00           | 11.548          | 11.110          |
| %RSD      | .2680448        | .1008758        | .5336683        | .4852203        | .2672833        |

|    |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|
| #1 | 3331.002 | 71742.53 | 13421.37 | 2383.876 | 4147.402 |
| #2 | 3348.825 | 71756.99 | 13565.15 | 2366.887 | 4168.988 |
| #3 | 3338.456 | 71874.57 | 13486.51 | 2388.930 | 4153.629 |

Sample Name: Q1151-02DLX5      Acquired: 1/29/2025 16:18:01      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: MC0AZ1      Custom ID2:      Custom ID3:  
Comment:

|        |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | As1890          | Tl1908          | Pb2203          | Se1960          | Sb2068          | Al3961          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>.0224758</b> | <b>-.000810</b> | <b>.5971860</b> | <b>.0115847</b> | <b>.0081355</b> | <b>9.462948</b> |
| Stddev | .0024467        | .001575         | .0020974        | .0021431        | .0021699        | .030229         |
| %RSD   | 10.88596        | 194.4647        | .3512099        | 18.49981        | 26.67218        | .3194482        |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .0197104 | .000129  | .5980643 | .0115201 | .0101001 | 9.466875 |
| #2 | .0233577 | -.002628 | .5947922 | .0094746 | .0058064 | 9.491022 |
| #3 | .0243593 | .000070  | .5987014 | .0137595 | .0084998 | 9.430948 |

|        |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | Ba4934          | Be2348          | Cd2144          | Ca3736          | Cr2677          | Co2286          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>.0661240</b> | <b>.0009110</b> | <b>.0011463</b> | <b>7.093154</b> | <b>5.905280</b> | <b>2.425917</b> |
| Stddev | .0006479        | .0000286        | .0000241        | .020439         | .004827         | .003968         |
| %RSD   | .9798166        | 3.135135        | 2.103216        | .2881494        | .0817374        | .1635766        |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .0653866 | .0009216 | .0011708 | 7.070211 | 5.901729 | 2.425022 |
| #2 | .0666019 | .0008787 | .0011453 | 7.109416 | 5.903336 | 2.422473 |
| #3 | .0663835 | .0009327 | .0011227 | 7.099837 | 5.910776 | 2.430256 |

|        |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | Cu3247          | Fe2598          | Mn2576          | Mg2790          | Ni2316          | Ag3280          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>.2892964</b> | <b>26.62786</b> | <b>.2033433</b> | <b>4.166160</b> | <b>2.371819</b> | <b>-.000252</b> |
| Stddev | .0006401        | .08223          | .0009601        | .014595         | .003918         | .000181         |
| %RSD   | .2212603        | .3088037        | .4721664        | .3503179        | .1651734        | 71.78642        |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .2885799 | 26.59233 | .2022484 | 4.159261 | 2.372627 | -.000191 |
| #2 | .2898116 | 26.72187 | .2040418 | 4.156294 | 2.367561 | -.000456 |
| #3 | .2894978 | 26.56936 | .2037396 | 4.182926 | 2.375270 | -.000110 |

|        |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | Na8183          | V_2924          | Zn2138          | K_7698          | P_1774          | B_2496          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>7.196632</b> | <b>.0610559</b> | <b>.4401800</b> | <b>2.097294</b> | <b>2.377979</b> | <b>.0898778</b> |
| Stddev | .240318         | .0015574        | .0010872        | .012758         | .007362         | .0009760        |
| %RSD   | 3.339312        | 2.550789        | .2469952        | .6082864        | .3095696        | 1.085962        |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | 7.273524 | .0624930 | .4394549 | 2.097933 | 2.375897 | .0904604 |
| #2 | 7.389094 | .0612736 | .4396549 | 2.109719 | 2.371883 | .0904219 |
| #3 | 6.927278 | .0594011 | .4414301 | 2.084228 | 2.386158 | .0887509 |

Sample Name: Q1151-02DLX5      Acquired: 1/29/2025 16:18:01      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: MC0AZ1      Custom ID2:      Custom ID3:  
Comment:

| Elem   | Mo2020          | S_1820            | Si2516          | Sn1899          | Ti3361          | Li6707          |
|--------|-----------------|-------------------|-----------------|-----------------|-----------------|-----------------|
| Units  | ppm             | ppm               | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>.3606916</b> | <b>F 21.85227</b> | <b>2.844516</b> | <b>.0176235</b> | <b>.2410962</b> | <b>.0168747</b> |
| Stddev | .0008366        | .05251            | .011298         | .0005364        | .0011921        | .0005481        |
| %RSD   | .2319455        | .2402844          | .3971755        | 3.043693        | .4944378        | 3.247767        |
| #1     | .3615035        | 21.84000          | 2.835545        | .0171122        | .2411807        | .0168306        |
| #2     | .3607390        | 21.80698          | 2.840799        | .0175764        | .2398642        | .0163501        |
| #3     | .3598323        | 21.90982          | 2.857204        | .0181819        | .2422438        | .0174435        |

| Elem   | Sr4077          |
|--------|-----------------|
| Units  | ppm             |
| Avg    | <b>.1014745</b> |
| Stddev | .0005048        |
| %RSD   | .4974959        |
| #1     | .1012602        |
| #2     | .1020511        |
| #3     | .1011122        |

| Int. Std. | Y_2243          | Y_3600          | Y_3710          | Y_2243          | In2306          |
|-----------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Units     | Cts/S           | Cts/S           | Cts/S           | Cts/S           | Cts/S           |
| Avg       | <b>3349.137</b> | <b>71796.13</b> | <b>14046.30</b> | <b>2373.854</b> | <b>3944.941</b> |
| Stddev    | 6.522           | 272.26          | 102.58          | 14.119          | 6.412           |
| %RSD      | .1947416        | .3792176        | .7302711        | .5947864        | .1625474        |
| #1        | 3341.699        | 71524.57        | 13976.93        | 2362.578        | 3945.068        |
| #2        | 3351.833        | 72069.09        | 14164.13        | 2389.690        | 3951.290        |
| #3        | 3353.879        | 71794.74        | 13997.84        | 2369.294        | 3938.467        |



Sample Name: Q1159-01      Acquired: 1/29/2025 16:21:56      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: YE8C9      Custom ID2:      Custom ID3:  
Comment:

|        |          |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|----------|
| Elem   | As1890   | Tl1908   | Pb2203   | Se1960   | Sb2068   | Al3961   | Ba4934   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | .1345382 | -.010367 | .1231950 | .0403097 | .0098205 | 73.13456 | 1.798778 |
| Stddev | .0013687 | .000558  | .0013984 | .0029662 | .0008761 | .50057   | .010019  |
| %RSD   | 1.017311 | 5.377754 | 1.135068 | 7.358495 | 8.921597 | .6844480 | .5570061 |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | .1360255 | -.010070 | .1236131 | .0370828 | .0107771 | 73.66754 | 1.805782 |
| #2 | .1342573 | -.010021 | .1243365 | .0409287 | .0090571 | 73.06177 | 1.803251 |
| #3 | .1333317 | -.011010 | .1216352 | .0429175 | .0096272 | 72.67437 | 1.787302 |

|        |          |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|----------|
| Elem   | Be2348   | Cd2144   | Ca3736   | Cr2677   | Co2286   | Cu3247   | Fe2598   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | .0026583 | .0017184 | 22.27083 | .1952257 | .1653853 | .2239371 | 173.2333 |
| Stddev | .0000451 | .0000459 | .19102   | .0024537 | .0015786 | .0015289 | 1.3082   |
| %RSD   | 1.697215 | 2.671079 | .8576924 | 1.256853 | .9545085 | .6827404 | .7551608 |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | .0026840 | .0016717 | 22.48630 | .1980584 | .1671895 | .2256148 | 174.7433 |
| #2 | .0026846 | .0017634 | 22.20389 | .1938607 | .1647078 | .2226223 | 172.4440 |
| #3 | .0026062 | .0017201 | 22.12229 | .1937580 | .1642585 | .2235742 | 172.5125 |

|        |          |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|----------|
| Elem   | Mn2576   | Mg2790   | Ni2316   | Ag3280   | Na8183   | V_2924   | Zn2138   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | 8.440970 | 38.65893 | .3214922 | -.000022 | .2511353 | .1862940 | .4268455 |
| Stddev | .063989  | .38102   | .0024806 | .000099  | .2107686 | .0007294 | .0040460 |
| %RSD   | .7580805 | .9855839 | .7715939 | 438.7883 | 83.92630 | .3915492 | .9478836 |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | 8.510926 | 39.08995 | .3239007 | .000090  | .2005117 | .1856736 | .4299225 |
| #2 | 8.426590 | 38.36702 | .3216308 | -.000092 | .0702886 | .1870976 | .4283516 |
| #3 | 8.385394 | 38.51982 | .3189453 | -.000066 | .4826056 | .1861110 | .4222625 |

|        |          |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|----------|
| Elem   | K_7698   | P_1774   | B_2496   | Mo2020   | S_1820   | Si2516   | Sn1899   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | 1.036655 | 1.779237 | .3342442 | .0079744 | .1837722 | 1.662993 | .0010931 |
| Stddev | .019587  | .015803  | .0041147 | .0003961 | .0030388 | .010012  | .0009043 |
| %RSD   | 1.889447 | .8881622 | 1.231036 | 4.967571 | 1.653568 | .6020750 | 82.73204 |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | 1.059092 | 1.794920 | .3386280 | .0079648 | .1872687 | 1.657749 | .0000709 |
| #2 | 1.027902 | 1.779471 | .3304657 | .0083753 | .1822798 | 1.656692 | .0014195 |
| #3 | 1.022970 | 1.763318 | .3336388 | .0075832 | .1817682 | 1.674539 | .0017889 |

Sample Name: Q1159-01      Acquired: 1/29/2025 16:21:56      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: YE8C9      Custom ID2:      Custom ID3:  
Comment:

| Elem   | Ti3361          | Li6707          | Sr4077          |
|--------|-----------------|-----------------|-----------------|
| Units  | ppm             | ppm             | ppm             |
| Avg    | <b>.6816669</b> | <b>.0711779</b> | <b>.2264513</b> |
| Stddev | .0018240        | .0009501        | .0015161        |
| %RSD   | .2675822        | 1.334788        | .6695165        |

|    |                 |                 |                 |
|----|-----------------|-----------------|-----------------|
| #1 | <b>.6795918</b> | <b>.0710901</b> | <b>.2278055</b> |
| #2 | <b>.6823927</b> | <b>.0721689</b> | <b>.2267349</b> |
| #3 | <b>.6830164</b> | <b>.0702748</b> | <b>.2248133</b> |

| Int. Std. | Y_2243          | Y_3600          | Y_3710          | Y_2243          | In2306          |
|-----------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Units     | Cts/S           | Cts/S           | Cts/S           | Cts/S           | Cts/S           |
| Avg       | <b>3474.073</b> | <b>74041.19</b> | <b>14909.50</b> | <b>2451.886</b> | <b>3811.544</b> |
| Stddev    | 21.052          | 739.89          | 65.86           | 29.961          | 24.593          |
| %RSD      | .6059685        | .9993002        | .4417128        | 1.221953        | .6452164        |

|    |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|
| #1 | 3452.066 | 73189.53 | 14838.27 | 2419.098 | 3785.040 |
| #2 | 3476.134 | 74408.21 | 14968.18 | 2458.722 | 3815.966 |
| #3 | 3494.018 | 74525.82 | 14922.05 | 2477.838 | 3833.625 |

Sample Name: Q1151-01DLX40      Acquired: 1/29/2025 16:25:56      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: MC0AZ0      Custom ID2:      Custom ID3:  
Comment:

|        |                 |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | As1890          | Tl1908          | Pb2203          | Se1960          | Sb2068          | Al3961          | Ba4934          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>.0187640</b> | <b>.0109963</b> | <b>.0560347</b> | <b>.0092146</b> | <b>.0211938</b> | <b>.4041072</b> | <b>.0090349</b> |
| Stddev | .0004042        | .0016361        | .0012381        | .0027796        | .0012099        | .0033516        | .0006644        |
| %RSD   | 2.153985        | 14.87901        | 2.209583        | 30.16553        | 5.708592        | .8293723        | 7.353784        |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | .0183222 | .0123765 | .0571743 | .0073133 | .0212683 | .4032520 | .0090659 |
| #2 | .0191151 | .0091889 | .0547173 | .0079258 | .0199484 | .4012661 | .0083555 |
| #3 | .0188547 | .0114233 | .0562126 | .0124047 | .0223647 | .4078035 | .0096832 |

|        |                 |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | Be2348          | Cd2144          | Ca3736          | Cr2677          | Co2286          | Cu3247          | Fe2598          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>.0003664</b> | <b>.0001103</b> | <b>2.330600</b> | <b>13.53656</b> | <b>3.145471</b> | <b>.0891927</b> | <b>3.714706</b> |
| Stddev | .0000721        | .0000537        | .005931         | .06103          | .011125         | .0023206        | .014884         |
| %RSD   | 19.68381        | 48.72896        | .2544785        | .4508573        | .3536910        | 2.601769        | .4006658        |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | .0003479 | .0001111 | 2.330699 | 13.46889 | 3.149227 | .0918664 | 3.713616 |
| #2 | .0003054 | .0000562 | 2.336481 | 13.55339 | 3.132954 | .0880092 | 3.730105 |
| #3 | .0004460 | .0001636 | 2.324621 | 13.58742 | 3.154232 | .0877024 | 3.700398 |

|        |                 |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | Mn2576          | Mg2790          | Ni2316          | Ag3280          | Na8183          | V_2924          | Zn2138          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>.0608194</b> | <b>.3501130</b> | <b>2.673387</b> | <b>.0003170</b> | <b>1.030325</b> | <b>.0600911</b> | <b>.1017161</b> |
| Stddev | .0003767        | .0065209        | .009986         | .0001786        | .267136         | .0012291        | .0006484        |
| %RSD   | .6193150        | 1.862516        | .3735502        | 56.34592        | 25.92739        | 2.045394        | .6374662        |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | .0612364 | .3498135 | 2.678408 | .0003394 | 1.148080 | .0587265 | .1024408 |
| #2 | .0607179 | .3567786 | 2.661887 | .0004833 | .724542  | .0604354 | .1011908 |
| #3 | .0605038 | .3437471 | 2.679867 | .0001282 | 1.218352 | .0611112 | .1015167 |

|        |                 |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | K_7698          | P_1774          | B_2496          | Mo2020          | S_1820          | Si2516          | Sn1899          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>.0383791</b> | <b>.0677831</b> | <b>.0256588</b> | <b>1.621930</b> | <b>4.160503</b> | <b>.2168949</b> | <b>.0080175</b> |
| Stddev | .0370318        | .0006292        | .0004953        | .002120         | .026184         | .0008647        | .0007108        |
| %RSD   | 96.48958        | .9281890        | 1.930387        | .1307360        | .6293404        | .3986843        | 8.865129        |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | .0379783 | .0674987 | .0254993 | 1.623450 | 4.187748 | .2176663 | .0086469 |
| #2 | .0015493 | .0673464 | .0252629 | 1.619508 | 4.135529 | .2170583 | .0081588 |
| #3 | .0756097 | .0685043 | .0262143 | 1.622832 | 4.158232 | .2159602 | .0072466 |

Sample Name: Q1151-01DLX40      Acquired: 1/29/2025 16:25:56      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: MC0AZ0      Custom ID2:      Custom ID3:  
Comment:

| Elem   | Ti3361   | Li6707   | Sr4077   |
|--------|----------|----------|----------|
| Units  | ppm      | ppm      | ppm      |
| Avg    | .0105669 | .0004129 | .0222259 |
| Stddev | .0003084 | .0005358 | .0001163 |
| %RSD   | 2.918777 | 129.7745 | .5233569 |

|    |          |          |          |
|----|----------|----------|----------|
| #1 | .0109172 | .0006745 | .0222352 |
| #2 | .0103363 | .0007675 | .0223373 |
| #3 | .0104470 | -.000203 | .0221052 |

| Int. Std. | Y_2243   | Y_3600   | Y_3710   | Y_2243   | In2306   |
|-----------|----------|----------|----------|----------|----------|
| Units     | Cts/S    | Cts/S    | Cts/S    | Cts/S    | Cts/S    |
| Avg       | 3381.928 | 71088.64 | 13894.46 | 2349.035 | 4183.440 |
| Stddev    | 9.629    | 240.63   | 20.84    | 16.889   | 14.724   |
| %RSD      | .2847127 | .3384891 | .1499736 | .7189895 | .3519672 |

|    |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|
| #1 | 3370.863 | 71356.25 | 13916.71 | 2342.476 | 4169.907 |
| #2 | 3386.526 | 70890.10 | 13891.26 | 2336.410 | 4199.120 |
| #3 | 3388.397 | 71019.59 | 13875.41 | 2368.220 | 4181.293 |

Sample Name: Q1159-02      Acquired: 1/29/2025 16:29:56      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: YE8C9D      Custom ID2:      Custom ID3:  
Comment:

|        |          |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|----------|
| Elem   | As1890   | Tl1908   | Pb2203   | Se1960   | Sb2068   | Al3961   | Ba4934   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | .1332916 | -.008115 | .1241497 | .0390520 | .0104564 | 73.31936 | 1.815188 |
| Stddev | .0022437 | .003194  | .0020063 | .0026989 | .0015296 | .13492   | .003306  |
| %RSD   | 1.683272 | 39.36173 | 1.616031 | 6.911054 | 14.62833 | .1840165 | .1821311 |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | .1316711 | -.004829 | .1262752 | .0418528 | .0087586 | 73.35870 | 1.817508 |
| #2 | .1323513 | -.008305 | .1238852 | .0364681 | .0117271 | 73.43023 | 1.816653 |
| #3 | .1358524 | -.011209 | .1222888 | .0388352 | .0108834 | 73.16914 | 1.811402 |

|        |          |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|----------|
| Elem   | Be2348   | Cd2144   | Ca3736   | Cr2677   | Co2286   | Cu3247   | Fe2598   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | .0026891 | .0017957 | 22.39426 | .1948245 | .1655866 | .2269862 | 173.7950 |
| Stddev | .0001535 | .0000573 | .06063   | .0005559 | .0009019 | .0015656 | .4200    |
| %RSD   | 5.708195 | 3.193321 | .2707388 | .2853225 | .5446574 | .6897116 | .2416801 |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | .0027382 | .0018549 | 22.43003 | .1952290 | .1665949 | .2252458 | 173.8842 |
| #2 | .0028120 | .0017404 | 22.42851 | .1941906 | .1648567 | .2282797 | 174.1633 |
| #3 | .0025170 | .0017919 | 22.32426 | .1950538 | .1653083 | .2274331 | 173.3375 |

|        |          |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|----------|
| Elem   | Mn2576   | Mg2790   | Ni2316   | Ag3280   | Na8183   | V_2924   | Zn2138   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | 8.547086 | 39.02682 | .3210292 | .0000818 | -.021327 | .1925470 | .4237105 |
| Stddev | .018885  | .07396   | .0013079 | .0003503 | .165116  | .0019752 | .0037276 |
| %RSD   | .2209565 | .1895234 | .4074192 | 428.0148 | 774.1982 | 1.025822 | .8797611 |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | 8.544439 | 39.07596 | .3224795 | .0001676 | -.183422 | .1943838 | .4232525 |
| #2 | 8.567155 | 39.06274 | .3199390 | .0003813 | -.027214 | .1904577 | .4276459 |
| #3 | 8.529663 | 38.94175 | .3206691 | -.000303 | .146653  | .1927996 | .4202330 |

|        |          |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|----------|
| Elem   | K_7698   | P_1774   | B_2496   | Mo2020   | S_1820   | Si2516   | Sn1899   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | 1.038283 | 1.793097 | .3356644 | .0085572 | .1819520 | 1.881504 | .0008747 |
| Stddev | .015807  | .007598  | .0023185 | .0001743 | .0034081 | .017314  | .0006804 |
| %RSD   | 1.522410 | .4237169 | .6907053 | 2.036676 | 1.873073 | .9202142 | 77.78547 |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | 1.050367 | 1.797864 | .3382919 | .0085774 | .1821039 | 1.865954 | .0012053 |
| #2 | 1.044087 | 1.784336 | .3347953 | .0083737 | .1784705 | 1.900161 | .0013268 |
| #3 | 1.020394 | 1.797092 | .3339061 | .0087205 | .1852816 | 1.878397 | .0000922 |

Sample Name: Q1159-02      Acquired: 1/29/2025 16:29:56      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: YE8C9D      Custom ID2:      Custom ID3:  
Comment:

|        |          |          |          |
|--------|----------|----------|----------|
| Elem   | Ti3361   | Li6707   | Sr4077   |
| Units  | ppm      | ppm      | ppm      |
| Avg    | .6911790 | .0723408 | .2272967 |
| Stddev | .0008851 | .0005012 | .0003243 |
| %RSD   | .1280508 | .6927918 | .1426642 |

|    |          |          |          |
|----|----------|----------|----------|
| #1 | .6921987 | .0725685 | .2269232 |
| #2 | .6906097 | .0726878 | .2275053 |
| #3 | .6907286 | .0717663 | .2274618 |

|           |          |          |          |          |          |
|-----------|----------|----------|----------|----------|----------|
| Int. Std. | Y_2243   | Y_3600   | Y_3710   | Y_2243   | In2306   |
| Units     | Cts/S    | Cts/S    | Cts/S    | Cts/S    | Cts/S    |
| Avg       | 3497.706 | 74078.34 | 14765.81 | 2491.224 | 3819.523 |
| Stddev    | 9.312    | 220.51   | 48.65    | 8.570    | 10.019   |
| %RSD      | .2662400 | .2976685 | .3294990 | .3440216 | .2623000 |

|    |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|
| #1 | 3487.084 | 74078.68 | 14804.52 | 2491.671 | 3808.983 |
| #2 | 3504.470 | 73857.66 | 14711.19 | 2482.439 | 3828.922 |
| #3 | 3501.562 | 74298.68 | 14781.72 | 2499.562 | 3820.664 |

Sample Name: Q1159-01LX5      Acquired: 1/29/2025 16:33:55      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: YE8C9L      Custom ID2:      Custom ID3:  
Comment:

|        |          |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|----------|
| Elem   | As1890   | Tl1908   | Pb2203   | Se1960   | Sb2068   | Al3961   | Ba4934   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | .0279216 | -.000110 | .0261435 | .0065358 | .0010576 | 15.08716 | .3639199 |
| Stddev | .0002771 | .002720  | .0005407 | .0036036 | .0008637 | .01812   | .0010852 |
| %RSD   | .9924418 | 2471.147 | 2.068169 | 55.13619 | 81.66438 | .1200781 | .2982016 |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | .0276386 | .002730  | .0260613 | .0041233 | .0001171 | 15.09504 | .3627905 |
| #2 | .0281924 | -.002693 | .0256486 | .0048059 | .0018151 | 15.06644 | .3640144 |
| #3 | .0279339 | -.000367 | .0267206 | .0106782 | .0012406 | 15.10000 | .3649547 |

|        |          |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|----------|
| Elem   | Be2348   | Cd2144   | Ca3736   | Cr2677   | Co2286   | Cu3247   | Fe2598   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | .0005779 | .0002057 | 4.653275 | .0420364 | .0333367 | .0488310 | 36.44546 |
| Stddev | .0000310 | .0000233 | .021649  | .0001666 | .0002551 | .0014570 | .07372   |
| %RSD   | 5.362842 | 11.33144 | .4652403 | .3962448 | .7652469 | 2.983708 | .2022632 |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | .0005919 | .0001909 | 4.632043 | .0418802 | .0336035 | .0487312 | 36.50610 |
| #2 | .0005994 | .0002326 | 4.675318 | .0420172 | .0333113 | .0474265 | 36.46687 |
| #3 | .0005424 | .0001937 | 4.652463 | .0422117 | .0330952 | .0503353 | 36.36341 |

|        |          |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|----------|
| Elem   | Mn2576   | Mg2790   | Ni2316   | Ag3280   | Na8183   | V_2924   | Zn2138   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | 1.761334 | 8.019258 | .0656501 | -.000500 | .0326023 | .0437304 | .0862960 |
| Stddev | .002824  | .036007  | .0000984 | .000410  | .2736923 | .0010148 | .0009154 |
| %RSD   | .1603167 | .4490008 | .1499041 | 82.04253 | 839.4875 | 2.320548 | 1.060706 |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | 1.758134 | 7.987159 | .0657231 | -.000526 | -.099770 | .0445519 | .0861383 |
| #2 | 1.763476 | 8.058193 | .0655382 | -.000078 | -.149739 | .0440433 | .0872800 |
| #3 | 1.762391 | 8.012423 | .0656888 | -.000897 | .347315  | .0425961 | .0854698 |

|        |          |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|----------|
| Elem   | K_7698   | P_1774   | B_2496   | Mo2020   | S_1820   | Si2516   | Sn1899   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | .1995205 | .3576457 | .0630225 | .0018730 | .0430623 | .7778326 | -.000241 |
| Stddev | .0034329 | .0016931 | .0006494 | .0001855 | .0044145 | .0028200 | .000837  |
| %RSD   | 1.720562 | .4734081 | 1.030421 | 9.903475 | 10.25135 | .3625475 | 347.0602 |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | .1974933 | .3565762 | .0623347 | .0016860 | .0481529 | .7749590 | .000269  |
| #2 | .2034841 | .3567631 | .0631076 | .0020569 | .0402895 | .7805958 | -.001207 |
| #3 | .1975842 | .3595978 | .0636251 | .0018762 | .0407444 | .7779430 | .000214  |

Sample Name: Q1159-01LX5      Acquired: 1/29/2025 16:33:55      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: YE8C9L      Custom ID2:      Custom ID3:  
Comment:

|        |          |          |          |
|--------|----------|----------|----------|
| Elem   | Ti3361   | Li6707   | Sr4077   |
| Units  | ppm      | ppm      | ppm      |
| Avg    | .1472591 | .0148808 | .0466970 |
| Stddev | .0002732 | .0010703 | .0001165 |
| %RSD   | .1855379 | 7.192142 | .2493707 |

|    |          |          |          |
|----|----------|----------|----------|
| #1 | .1473897 | .0140609 | .0465939 |
| #2 | .1474425 | .0144900 | .0468233 |
| #3 | .1469451 | .0160916 | .0466738 |

|           |          |          |          |          |          |
|-----------|----------|----------|----------|----------|----------|
| Int. Std. | Y_2243   | Y_3600   | Y_3710   | Y_2243   | In2306   |
| Units     | Cts/S    | Cts/S    | Cts/S    | Cts/S    | Cts/S    |
| Avg       | 3478.687 | 72252.00 | 13844.90 | 2442.941 | 4084.368 |
| Stddev    | 5.406    | 259.66   | 71.78    | 14.891   | 6.106    |
| %RSD      | .1554021 | .3593872 | .5184823 | .6095590 | .1494912 |

|    |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|
| #1 | 3472.473 | 72446.43 | 13880.73 | 2444.690 | 4077.865 |
| #2 | 3481.282 | 71957.12 | 13762.25 | 2427.252 | 4085.259 |
| #3 | 3482.306 | 72352.46 | 13891.70 | 2456.880 | 4089.979 |



Sample Name: Q1159-03      Acquired: 1/29/2025 16:38:00      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: YE8C9S      Custom ID2:      Custom ID3:  
Comment:

|        |                 |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | As1890          | Tl1908          | Pb2203          | Se1960          | Sb2068          | Al3961          | Ba4934          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>.1989204</b> | <b>.0721886</b> | <b>.1586515</b> | <b>.2090398</b> | <b>.1820507</b> | <b>75.13967</b> | <b>5.519214</b> |
| Stddev | .0012356        | .0020713        | .0014387        | .0039625        | .0022335        | .42569          | .088679         |
| %RSD   | .6211361        | 2.869326        | .9068333        | 1.895588        | 1.226875        | .5665296        | 1.606729        |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | .1976060 | .0698360 | .1601376 | .2114475 | .1827368 | 75.03786 | 5.543283 |
| #2 | .2000580 | .0729914 | .1572654 | .2112054 | .1795546 | 75.60704 | 5.420986 |
| #3 | .1990973 | .0737383 | .1585514 | .2044663 | .1838607 | 74.77412 | 5.593375 |

|        |                 |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | Be2348          | Cd2144          | Ca3736          | Cr2677          | Co2286          | Cu3247          | Fe2598          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>.0933429</b> | <b>.0981251</b> | <b>21.87760</b> | <b>.6036258</b> | <b>1.119101</b> | <b>.6882171</b> | <b>171.6394</b> |
| Stddev | .0004915        | .0010430        | .03871          | .0026362        | .010214         | .0039767        | .4100           |
| %RSD   | .5265741        | 1.062885        | .1769366        | .4367203        | .9127070        | .5778318        | .2388546        |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | .0938591 | .0991475 | 21.91326 | .6065531 | 1.128486 | .6872993 | 171.8532 |
| #2 | .0928805 | .0970627 | 21.88312 | .6028848 | 1.108222 | .6925725 | 171.8983 |
| #3 | .0932891 | .0981651 | 21.83643 | .6014394 | 1.120596 | .6847795 | 171.1667 |

|        |                 |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | Mn2576          | Mg2790          | Ni2316          | Ag3280          | Na8183          | V_2924          | Zn2138          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>9.269824</b> | <b>37.92954</b> | <b>1.274786</b> | <b>.0707116</b> | <b>.2919342</b> | <b>1.142171</b> | <b>1.311123</b> |
| Stddev | .026451         | .13104          | .013424         | .0009065        | .1509470        | .004531         | .010927         |
| %RSD   | .2853414        | .3454787        | 1.053069        | 1.281940        | 51.70582        | .3966679        | .8333774        |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | 9.267612 | 38.08074 | 1.285816 | .0714425 | .2532445 | 1.138259 | 1.315679 |
| #2 | 9.297311 | 37.85889 | 1.259839 | .0709951 | .1640977 | 1.141118 | 1.319034 |
| #3 | 9.244549 | 37.84899 | 1.278704 | .0696973 | .4584602 | 1.147135 | 1.298655 |

|        |                 |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | K_7698          | P_1774          | B_2496          | Mo2020          | S_1820          | Si2516          | Sn1899          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>1.007179</b> | <b>1.743936</b> | <b>.3264262</b> | <b>.0077095</b> | <b>.1770812</b> | <b>2.600234</b> | <b>.0008911</b> |
| Stddev | .008007         | .018528         | .0047247        | .0002250        | .0047845        | .017727         | .0010068        |
| %RSD   | .7950061        | 1.062443        | 1.447386        | 2.918952        | 2.701842        | .6817640        | 112.9916        |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | 1.000545 | 1.761382 | .3248346 | .0075526 | .1825618 | 2.585378 | -.000041 |
| #2 | 1.016074 | 1.724488 | .3317411 | .0079673 | .1737383 | 2.595466 | .001959  |
| #3 | 1.004919 | 1.745938 | .3227029 | .0076086 | .1749436 | 2.619858 | .000756  |

Sample Name: Q1159-03      Acquired: 1/29/2025 16:38:00      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: YE8C9S      Custom ID2:      Custom ID3:  
Comment:

|        |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|
| Elem   | Ti3361          | Li6707          | Sr4077          |
| Units  | ppm             | ppm             | ppm             |
| Avg    | <b>.6848287</b> | <b>.0709029</b> | <b>.2237726</b> |
| Stddev | .0039212        | .0005327        | .0017554        |
| %RSD   | .5725808        | .7513310        | .7844509        |

|    |                 |                 |                 |
|----|-----------------|-----------------|-----------------|
| #1 | <b>.6807523</b> | <b>.0705935</b> | <b>.2227825</b> |
| #2 | <b>.6851600</b> | <b>.0705972</b> | <b>.2257994</b> |
| #3 | <b>.6885737</b> | <b>.0715180</b> | <b>.2227359</b> |

|           |                 |                 |                 |                 |                 |
|-----------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Int. Std. | Y_2243          | Y_3600          | Y_3710          | Y_2243          | In2306          |
| Units     | Cts/S           | Cts/S           | Cts/S           | Cts/S           | Cts/S           |
| Avg       | <b>3551.130</b> | <b>74783.27</b> | <b>14845.48</b> | <b>2498.132</b> | <b>3894.601</b> |
| Stddev    | 20.817          | 286.07          | 107.69          | 15.656          | 30.436          |
| %RSD      | .5862209        | .3825270        | .7253787        | .6267221        | .7814970        |

|    |                 |                 |                 |                 |                 |
|----|-----------------|-----------------|-----------------|-----------------|-----------------|
| #1 | <b>3533.563</b> | <b>74468.35</b> | <b>14768.89</b> | <b>2480.968</b> | <b>3869.746</b> |
| #2 | <b>3574.123</b> | <b>75027.07</b> | <b>14968.61</b> | <b>2501.796</b> | <b>3928.547</b> |
| #3 | <b>3545.704</b> | <b>74854.38</b> | <b>14798.95</b> | <b>2511.631</b> | <b>3885.510</b> |

Sample Name: Q1159-04      Acquired: 1/29/2025 16:42:04      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: YE8D1      Custom ID2:      Custom ID3:  
Comment:

|        |                 |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | As1890          | Tl1908          | Pb2203          | Se1960          | Sb2068          | Al3961          | Ba4934          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>.0887378</b> | <b>-.011760</b> | <b>.0787777</b> | <b>.0693282</b> | <b>.0165920</b> | <b>121.9645</b> | <b>.3674591</b> |
| Stddev | .0022932        | .002327         | .0018034        | .0038167        | .0006506        | 1.0064          | .0024645        |
| %RSD   | 2.584289        | 19.79146        | 2.289271        | 5.505237        | 3.921170        | .8251620        | .6706778        |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | .0911409 | -.011266 | .0794296 | .0716241 | .0158409 | 120.9884 | .3650328 |
| #2 | .0865731 | -.014295 | .0801645 | .0714381 | .0169536 | 121.9065 | .3673845 |
| #3 | .0884995 | -.009719 | .0767389 | .0649223 | .0169814 | 122.9987 | .3699600 |

|        |                 |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | Be2348          | Cd2144          | Ca3736          | Cr2677          | Co2286          | Cu3247          | Fe2598          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>.0002061</b> | <b>.0044174</b> | <b>22.85970</b> | <b>.2406294</b> | <b>.1510998</b> | <b>.3629217</b> | <b>288.8741</b> |
| Stddev | .0000574        | .0000237        | .14685          | .0008478        | .0008404        | .0045191        | 1.6275          |
| %RSD   | 27.85674        | .5370632        | .6423988        | .3523202        | .5562145        | 1.245186        | .5633941        |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | .0002536 | .0043903 | 22.72364 | .2411317 | .1505256 | .3593829 | 287.2934 |
| #2 | .0002225 | .0044344 | 22.84011 | .2396506 | .1507092 | .3613700 | 288.7842 |
| #3 | .0001423 | .0044277 | 23.01537 | .2411060 | .1520644 | .3680121 | 290.5447 |

|        |                 |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | Mn2576          | Mg2790          | Ni2316          | Ag3280          | Na8183          | V_2924          | Zn2138          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>3.856474</b> | <b>69.45780</b> | <b>.5787482</b> | <b>-.001581</b> | <b>.1586748</b> | <b>.1877630</b> | <b>.8447507</b> |
| Stddev | .019841         | .23025          | .0026737        | .000255         | .1504231        | .0028125        | .0072577        |
| %RSD   | .5144842        | .3315005        | .4619886        | 16.15163        | 94.79962        | 1.497916        | .8591536        |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | 3.837738 | 69.21319 | .5770728 | -.001681 | .1412538 | .1874028 | .8371684 |
| #2 | 3.854423 | 69.48987 | .5773400 | -.001771 | .3170498 | .1851479 | .8454506 |
| #3 | 3.877260 | 69.67034 | .5818317 | -.001290 | .0177207 | .1907383 | .8516331 |

|        |                 |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | K_7698          | P_1774          | B_2496          | Mo2020          | S_1820          | Si2516          | Sn1899          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>3.636893</b> | <b>4.628483</b> | <b>.5552343</b> | <b>.0078159</b> | <b>.1170053</b> | <b>3.369085</b> | <b>.0015378</b> |
| Stddev | .003790         | .020881         | .0122962        | .0001650        | .0051089        | .017887         | .0003214        |
| %RSD   | .1041987        | .4511315        | 2.214600        | 2.110623        | 4.366362        | .5309281        | 20.90182        |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | 3.634817 | 4.616401 | .5424110 | .0076416 | .1225796 | 3.374185 | .0017620 |
| #2 | 3.641267 | 4.616455 | .5563666 | .0078366 | .1125459 | 3.349201 | .0011695 |
| #3 | 3.634596 | 4.652594 | .5669251 | .0079696 | .1158905 | 3.383868 | .0016817 |

Sample Name: Q1159-04      Acquired: 1/29/2025 16:42:04      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: YE8D1      Custom ID2:      Custom ID3:  
Comment:

|        |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|
| Elem   | Ti3361          | Li6707          | Sr4077          |
| Units  | ppm             | ppm             | ppm             |
| Avg    | <b>.2520343</b> | <b>.2451030</b> | <b>.2154560</b> |
| Stddev | .0031067        | .0020283        | .0018797        |
| %RSD   | 1.232661        | .8275084        | .8724049        |

|    |                 |                 |                 |
|----|-----------------|-----------------|-----------------|
| #1 | <b>.2495242</b> | <b>.2429598</b> | <b>.2135534</b> |
| #2 | <b>.2555089</b> | <b>.2453568</b> | <b>.2155029</b> |
| #3 | <b>.2510698</b> | <b>.2469924</b> | <b>.2173118</b> |

|           |                 |                 |                 |                 |                 |
|-----------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Int. Std. | Y_2243          | Y_3600          | Y_3710          | Y_2243          | In2306          |
| Units     | Cts/S           | Cts/S           | Cts/S           | Cts/S           | Cts/S           |
| Avg       | <b>3445.026</b> | <b>74137.83</b> | <b>14975.68</b> | <b>2432.202</b> | <b>3706.353</b> |
| Stddev    | 17.442          | 173.85          | 65.16           | 10.918          | 12.966          |
| %RSD      | .5062929        | .2344890        | .4350867        | .4489023        | .3498216        |

|    |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|
| #1 | 3454.745 | 74246.64 | 14900.73 | 2444.213 | 3710.549 |
| #2 | 3455.443 | 74229.52 | 15007.47 | 2429.514 | 3716.700 |
| #3 | 3424.890 | 73937.34 | 15018.84 | 2422.878 | 3691.809 |

Sample Name: Q1159-05      Acquired: 1/29/2025 16:46:01      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: YE8D3      Custom ID2:      Custom ID3:  
Comment:

|        |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | As1890          | Tl1908          | Pb2203          | Se1960          | Sb2068          | Al3961          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>1.256717</b> | <b>-.021119</b> | <b>.2933137</b> | <b>.0894242</b> | <b>.0383522</b> | <b>17.47713</b> |
| Stddev | .003641         | .000248         | .0003109        | .0017594        | .0016715        | .07660          |
| %RSD   | .2897251        | 1.174566        | .1059982        | 1.967506        | 4.358164        | .4382918        |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | 1.252528 | -.021315 | .2930750 | .0897451 | .0401157 | 17.40520 |
| #2 | 1.258495 | -.021200 | .2932008 | .0910011 | .0381496 | 17.46853 |
| #3 | 1.259127 | -.020840 | .2936653 | .0875264 | .0367912 | 17.55767 |

|        |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | Ba4934          | Be2348          | Cd2144          | Ca3736          | Cr2677          | Co2286          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>.2465302</b> | <b>.0006597</b> | <b>.0070313</b> | <b>303.5352</b> | <b>.0233365</b> | <b>.2057084</b> |
| Stddev | .0014390        | .0001525        | .0001416        | 1.9324          | .0001904        | .0003957        |
| %RSD   | .5837104        | 23.11815        | 2.013833        | .6366232        | .8160572        | .1923707        |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .2450057 | .0007862 | .0069185 | 305.7422 | .0231441 | .2058010 |
| #2 | .2467198 | .0007026 | .0069852 | 302.7163 | .0235249 | .2052746 |
| #3 | .2478650 | .0004904 | .0071902 | 302.1471 | .0233405 | .2060496 |

|        |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | Cu3247          | Fe2598          | Mn2576          | Mg2790          | Ni2316          | Ag3280          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>.6357874</b> | <b>335.3643</b> | <b>5.291124</b> | <b>86.32386</b> | <b>.8198033</b> | <b>-.001542</b> |
| Stddev | .0034018        | .9827           | .020346         | .35949          | .0018325        | .000145         |
| %RSD   | .5350502        | .2930364        | .3845346        | .4164378        | .2235309        | 9.431751        |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .6386451 | 334.2462 | 5.271712 | 85.96757 | .8203824 | -.001656 |
| #2 | .6366924 | 335.7557 | 5.289370 | 86.68645 | .8177512 | -.001378 |
| #3 | .6320246 | 336.0911 | 5.312290 | 86.31755 | .8212763 | -.001591 |

|        |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | Na8183          | V_2924          | Zn2138          | K_7698          | P_1774          | B_2496          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>.0789373</b> | <b>-.000262</b> | <b>.3997445</b> | <b>6.031671</b> | <b>8.785172</b> | <b>.5555663</b> |
| Stddev | .1228436        | .000756         | .0019542        | .041413         | .035136         | .0057771        |
| %RSD   | 155.6217        | 289.1233        | .4888719        | .6865925        | .3999446        | 1.039858        |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | -.026121 | -.001134 | .3974895 | 6.077656 | 8.798267 | .5542468 |
| #2 | .048928  | .000135  | .4007993 | 5.997317 | 8.745370 | .5505631 |
| #3 | .214005  | .000214  | .4009448 | 6.020040 | 8.811881 | .5618890 |

Sample Name: Q1159-05      Acquired: 1/29/2025 16:46:01      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: YE8D3      Custom ID2:      Custom ID3:  
Comment:

|        |          |            |          |          |          |          |
|--------|----------|------------|----------|----------|----------|----------|
| Elem   | Mo2020   | S_1820     | Si2516   | Sn1899   | Ti3361   | Li6707   |
| Units  | ppm      | ppm        | ppm      | ppm      | ppm      | ppm      |
| Avg    | .0176206 | F 148.8798 | 2.253039 | -.001275 | .0674164 | .0308626 |
| Stddev | .0005230 | .4595      | .025577  | .000908  | .0014263 | .0003879 |
| %RSD   | 2.968210 | .3086108   | 1.135239 | 71.18077 | 2.115596 | 1.256726 |

|    |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|
| #1 | .0178769 | 148.9528 | 2.223514 | -.001490 | .0677750 | .0313099 |
| #2 | .0179660 | 148.3882 | 2.267138 | -.000279 | .0686292 | .0306188 |
| #3 | .0170189 | 149.2984 | 2.268464 | -.002056 | .0658451 | .0306592 |

|        |          |
|--------|----------|
| Elem   | Sr4077   |
| Units  | ppm      |
| Avg    | 3.750075 |
| Stddev | .028509  |
| %RSD   | .7602258 |

|    |          |
|----|----------|
| #1 | 3.749366 |
| #2 | 3.721926 |
| #3 | 3.778931 |

|           |          |          |          |          |          |
|-----------|----------|----------|----------|----------|----------|
| Int. Std. | Y_2243   | Y_3600   | Y_3710   | Y_2243   | In2306   |
| Units     | Cts/S    | Cts/S    | Cts/S    | Cts/S    | Cts/S    |
| Avg       | 3424.983 | 74428.86 | 14738.65 | 2429.649 | 3453.599 |
| Stddev    | 7.727    | 193.58   | 102.68   | 6.510    | 10.038   |
| %RSD      | .2255925 | .2600862 | .6966882 | .2679283 | .2906595 |

|    |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|
| #1 | 3420.926 | 74382.17 | 14721.65 | 2422.598 | 3444.688 |
| #2 | 3433.892 | 74262.90 | 14645.53 | 2435.430 | 3464.474 |
| #3 | 3420.129 | 74641.52 | 14848.77 | 2430.918 | 3451.635 |

Sample Name: Q1159-06      Acquired: 1/29/2025 16:50:14      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: YE8E2      Custom ID2:      Custom ID3:  
Comment:

|        |                 |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | As1890          | Tl1908          | Pb2203          | Se1960          | Sb2068          | Al3961          | Ba4934          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>.0501549</b> | <b>-.001240</b> | <b>.1224121</b> | <b>.0374812</b> | <b>.0075337</b> | <b>68.62378</b> | <b>.2786039</b> |
| Stddev | .0021631        | .003235         | .0006409        | .0044340        | .0013166        | .55767          | .0024726        |
| %RSD   | 4.312808        | 260.8047        | .5235320        | 11.82998        | 17.47626        | .8126516        | .8875100        |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | .0517200 | .002486  | .1222881 | .0351506 | .0074955 | 69.26766 | .2814569 |
| #2 | .0476866 | -.003328 | .1218423 | .0346985 | .0062366 | 68.29384 | .2770808 |
| #3 | .0510580 | -.002880 | .1231059 | .0425945 | .0088690 | 68.30984 | .2772740 |

|        |                 |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | Be2348          | Cd2144          | Ca3736          | Cr2677          | Co2286          | Cu3247          | Fe2598          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>.0007501</b> | <b>.0013262</b> | <b>11.36348</b> | <b>.0459947</b> | <b>.0614190</b> | <b>.3675516</b> | <b>140.7550</b> |
| Stddev | .0000717        | .0000858        | .06465          | .0002159        | .0005908        | .0018699        | .8272           |
| %RSD   | 9.556740        | 6.467776        | .5689162        | .4694046        | .9618876        | .5087346        | .5877157        |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | .0006674 | .0012471 | 11.43813 | .0458904 | .0615190 | .3654069 | 141.7099 |
| #2 | .0007929 | .0013141 | 11.32630 | .0458507 | .0607846 | .3684085 | 140.3001 |
| #3 | .0007902 | .0014173 | 11.32601 | .0462429 | .0619534 | .3688396 | 140.2551 |

|        |                 |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | Mn2576          | Mg2790          | Ni2316          | Ag3280          | Na8183          | V_2924          | Zn2138          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>.6125545</b> | <b>52.68390</b> | <b>.1649776</b> | <b>-.001030</b> | <b>.5003016</b> | <b>.0175115</b> | <b>.7279208</b> |
| Stddev | .0023178        | .21520          | .0012326        | .000298         | .1801363        | .0006896        | .0057294        |
| %RSD   | .3783777        | .4084760        | .7471187        | 28.96343        | 36.00553        | 3.938028        | .7870883        |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | .6143350 | 52.93196 | .1642469 | -.000925 | .5696077 | .0169213 | .7284984 |
| #2 | .6099338 | 52.57256 | .1642853 | -.000798 | .6354913 | .0173436 | .7219244 |
| #3 | .6133946 | 52.54717 | .1664007 | -.001367 | .2958058 | .0182695 | .7333394 |

|        |                 |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | K_7698          | P_1774          | B_2496          | Mo2020          | S_1820          | Si2516          | Sn1899          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>3.953129</b> | <b>2.934455</b> | <b>.2694166</b> | <b>.0216714</b> | <b>7.937990</b> | <b>4.289885</b> | <b>-.000420</b> |
| Stddev | .101298         | .025796         | .0050015        | .0001838        | .067173         | .024270         | .000453         |
| %RSD   | 2.562472        | .8790612        | 1.856404        | .8481026        | .8462264        | .5657504        | 107.7185        |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | 4.069037 | 2.931643 | .2747413 | .0218113 | 7.918953 | 4.293313 | .000084  |
| #2 | 3.881562 | 2.910181 | .2686909 | .0214633 | 7.882390 | 4.312258 | -.000552 |
| #3 | 3.908788 | 2.961542 | .2648177 | .0217396 | 8.012628 | 4.264083 | -.000793 |

Sample Name: Q1159-06      Acquired: 1/29/2025 16:50:14      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: YE8E2      Custom ID2:      Custom ID3:  
Comment:

|        |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|
| Elem   | Ti3361          | Li6707          | Sr4077          |
| Units  | ppm             | ppm             | ppm             |
| Avg    | <b>.1338812</b> | <b>.1732689</b> | <b>.0887259</b> |
| Stddev | .0008944        | .0016405        | .0006002        |
| %RSD   | .6680438        | .9467989        | .6764925        |

|    |                 |                 |                 |
|----|-----------------|-----------------|-----------------|
| #1 | <b>.1346043</b> | <b>.1751632</b> | <b>.0894023</b> |
| #2 | <b>.1341582</b> | <b>.1723177</b> | <b>.0882567</b> |
| #3 | <b>.1328811</b> | <b>.1723257</b> | <b>.0885188</b> |

|           |                 |                 |                 |                 |                 |
|-----------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Int. Std. | Y_2243          | Y_3600          | Y_3710          | Y_2243          | In2306          |
| Units     | Cts/S           | Cts/S           | Cts/S           | Cts/S           | Cts/S           |
| Avg       | <b>3402.878</b> | <b>72344.57</b> | <b>14367.31</b> | <b>2416.732</b> | <b>3864.416</b> |
| Stddev    | 20.907          | 240.22          | 56.19           | 5.721           | 29.720          |
| %RSD      | .6144053        | .3320534        | .3910789        | .2367054        | .7690565        |

|    |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|
| #1 | 3408.460 | 72109.34 | 14428.78 | 2411.159 | 3869.607 |
| #2 | 3420.429 | 72334.87 | 14318.61 | 2416.449 | 3891.197 |
| #3 | 3379.747 | 72589.50 | 14354.53 | 2422.589 | 3832.442 |



Sample Name: PB166301BL      Acquired: 1/29/2025 16:54:14      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: PBS301      Custom ID2:      Custom ID3:  
Comment:

|        |          |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|----------|
| Elem   | As1890   | Tl1908   | Pb2203   | Se1960   | Sb2068   | Al3961   | Ba4934   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | .0014722 | .0005788 | -.000162 | -.000209 | -.000888 | .0034935 | -.001386 |
| Stddev | .0016262 | .0011777 | .000134  | .000890  | .001241  | .0022699 | .000364  |
| %RSD   | 110.4589 | 203.4647 | 82.83515 | 425.0691 | 139.7520 | 64.97396 | 26.29039 |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | .0027938 | .0002126 | -.000271 | .000632  | .000318  | .0011899 | -.000981 |
| #2 | .0019666 | .0018960 | -.000012 | -.000119 | -.000820 | .0035624 | -.001687 |
| #3 | -.000344 | -.000372 | -.000203 | -.001141 | -.002162 | .0057281 | -.001490 |

|        |          |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|----------|
| Elem   | Be2348   | Cd2144   | Ca3736   | Cr2677   | Co2286   | Cu3247   | Fe2598   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | -.000065 | .0000037 | .0006040 | .0000265 | -.000088 | .0016828 | .0012867 |
| Stddev | .000059  | .0000537 | .0043221 | .0004206 | .000046  | .0018395 | .0020630 |
| %RSD   | 90.61835 | 1444.386 | 715.6025 | 1588.415 | 52.76473 | 109.3091 | 160.3251 |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | .000002  | -.000058 | -.001006 | -.000379 | -.000137 | -.000152 | .0033567 |
| #2 | -.000109 | .000031  | .005500  | -.000003 | -.000080 | .001673  | .0012727 |
| #3 | -.000086 | .000039  | -.002682 | .000461  | -.000046 | .003527  | -.000769 |

|        |          |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|----------|
| Elem   | Mn2576   | Mg2790   | Ni2316   | Ag3280   | Na8183   | V_2924   | Zn2138   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | -.000009 | .0163660 | .0000343 | .0002192 | -.051921 | .0018158 | .0001182 |
| Stddev | .000310  | .0152790 | .0001385 | .0000848 | .164522  | .0005337 | .0029826 |
| %RSD   | 3612.855 | 93.35854 | 403.4249 | 38.68333 | 316.8716 | 29.39162 | 2524.196 |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | .000119  | .0173273 | .0001412 | .0002970 | .115684  | .0024221 | -.002983 |
| #2 | .000218  | .0006290 | .0000839 | .0002317 | -.213176 | .0016084 | .000371  |
| #3 | -.000362 | .0311416 | -.000122 | .0001288 | -.058270 | .0014170 | .002966  |

|        |          |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|----------|
| Elem   | K_7698   | P_1774   | B_2496   | Mo2020   | S_1820   | Si2516   | Sn1899   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | -.082991 | -.000544 | -.001887 | .0000723 | .0140713 | .0020464 | -.000790 |
| Stddev | .043761  | .000712  | .000507  | .0002118 | .0010214 | .0025711 | .000608  |
| %RSD   | 52.73033 | 130.8203 | 26.84248 | 292.7730 | 7.258593 | 125.6384 | 76.93164 |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | -.035963 | -.000722 | -.001303 | .0003136 | .0152476 | .0042574 | -.001421 |
| #2 | -.090493 | .000240  | -.002201 | -.000014 | .0134097 | -.000775 | -.000209 |
| #3 | -.122516 | -.001150 | -.002158 | -.000083 | .0135565 | .002657  | -.000741 |

Sample Name: PB166301BL      Acquired: 1/29/2025 16:54:14      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: PBS301      Custom ID2:      Custom ID3:  
Comment:

|        |          |          |          |
|--------|----------|----------|----------|
| Elem   | Ti3361   | Li6707   | Sr4077   |
| Units  | ppm      | ppm      | ppm      |
| Avg    | .0008493 | -.001151 | -.000035 |
| Stddev | .0003171 | .001222  | .000020  |
| %RSD   | 37.33305 | 106.1694 | 57.37050 |

|    |          |          |          |
|----|----------|----------|----------|
| #1 | .0006801 | -.001257 | -.000054 |
| #2 | .0012151 | .000120  | -.000036 |
| #3 | .0006527 | -.002318 | -.000014 |

|           |          |          |          |          |          |
|-----------|----------|----------|----------|----------|----------|
| Int. Std. | Y_2243   | Y_3600   | Y_3710   | Y_2243   | In2306   |
| Units     | Cts/S    | Cts/S    | Cts/S    | Cts/S    | Cts/S    |
| Avg       | 3434.646 | 72163.04 | 13392.38 | 2452.905 | 4175.397 |
| Stddev    | 2.399    | 126.32   | 41.20    | 7.232    | 6.759    |
| %RSD      | .0698387 | .1750503 | .3076184 | .2948397 | .1618852 |

|    |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|
| #1 | 3432.762 | 72068.35 | 13349.34 | 2444.568 | 4172.126 |
| #2 | 3437.346 | 72114.30 | 13396.36 | 2457.486 | 4183.170 |
| #3 | 3433.830 | 72306.47 | 13431.45 | 2456.662 | 4170.895 |

Sample Name: PB166301BS      Acquired: 1/29/2025 16:58:23      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: LCS301      Custom ID2:      Custom ID3:  
Comment:

|        |                 |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | As1890          | Tl1908          | Pb2203          | Se1960          | Sb2068          | Al3961          | Ba4934          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>.0204015</b> | <b>.0533871</b> | <b>.0204333</b> | <b>.0696364</b> | <b>.1149056</b> | <b>.3743441</b> | <b>.3857782</b> |
| Stddev | .0020603        | .0011946        | .0011372        | .0008329        | .0006655        | .0071780        | .0057485        |
| %RSD   | 10.09856        | 2.237617        | 5.565605        | 1.196045        | .5791292        | 1.917494        | 1.490119        |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | .0213022 | .0526877 | .0214121 | .0686946 | .1154593 | .3661194 | .3804609 |
| #2 | .0180443 | .0547665 | .0207022 | .0702761 | .1141673 | .3793454 | .3918779 |
| #3 | .0218581 | .0527072 | .0191858 | .0699384 | .1150900 | .3775674 | .3849958 |

|        |                 |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | Be2348          | Cd2144          | Ca3736          | Cr2677          | Co2286          | Cu3247          | Fe2598          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>.0103759</b> | <b>.0101741</b> | <b>9.603222</b> | <b>.0220295</b> | <b>.0993005</b> | <b>.0540444</b> | <b>.2034108</b> |
| Stddev | .0000124        | .0000791        | .108865         | .0003788        | .0000607        | .0017744        | .0058525        |
| %RSD   | .1199413        | .7774273        | 1.133626        | 1.719663        | .0611091        | 3.283175        | 2.877188        |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | .0103898 | .0101047 | 9.511716 | .0222531 | .0993062 | .0543044 | .2059993 |
| #2 | .0103657 | .0102602 | 9.723617 | .0222433 | .0992371 | .0556744 | .2075227 |
| #3 | .0103721 | .0101574 | 9.574333 | .0215921 | .0993581 | .0521543 | .1967104 |

|        |                 |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | Mn2576          | Mg2790          | Ni2316          | Ag3280          | Na8183          | V_2924          | Zn2138          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>.0309728</b> | <b>8.624251</b> | <b>.0806772</b> | <b>.0196446</b> | <b>9.472246</b> | <b>.1064658</b> | <b>.1198823</b> |
| Stddev | .0005916        | .062660         | .0001685        | .0003003        | .397996         | .0019069        | .0014560        |
| %RSD   | 1.909907        | .7265507        | .2088680        | 1.528595        | 4.201704        | 1.791039        | 1.214505        |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | .0302907 | 8.577438 | .0808069 | .0193709 | 9.275993 | .1082080 | .1194766 |
| #2 | .0312824 | 8.695434 | .0807380 | .0199658 | 9.210491 | .1067609 | .1214981 |
| #3 | .0313453 | 8.599879 | .0804867 | .0195969 | 9.930253 | .1044287 | .1186722 |

|        |                 |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | K_7698          | P_1774          | B_2496          | Mo2020          | S_1820          | Si2516          | Sn1899          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>9.211476</b> | <b>.0164769</b> | <b>-.001202</b> | <b>.0211628</b> | <b>.1814764</b> | <b>.8716308</b> | <b>.0134407</b> |
| Stddev | .112971         | .0013291        | .001173         | .0000983        | .0039241        | .0045356        | .0009027        |
| %RSD   | 1.226418        | 8.066280        | 97.62356        | .4642728        | 2.162291        | .5203641        | 6.716086        |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | 9.086019 | .0169538 | -.001973 | .0210897 | .1849568 | .8670806 | .0144690 |
| #2 | 9.305155 | .0149752 | .000148  | .0211243 | .1822487 | .8716603 | .0127792 |
| #3 | 9.243254 | .0175017 | -.001781 | .0212745 | .1772236 | .8761517 | .0130739 |

Sample Name: PB166301BS      Acquired: 1/29/2025 16:58:23      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: LCS301      Custom ID2:      Custom ID3:  
Comment:

|        |          |          |          |
|--------|----------|----------|----------|
| Elem   | Ti3361   | Li6707   | Sr4077   |
| Units  | ppm      | ppm      | ppm      |
| Avg    | .2080600 | .0292012 | .1964681 |
| Stddev | .0013034 | .0011893 | .0027596 |
| %RSD   | .6264287 | 4.072850 | 1.404620 |

|    |          |          |          |
|----|----------|----------|----------|
| #1 | .2073680 | .0293204 | .1937806 |
| #2 | .2095634 | .0303265 | .1992946 |
| #3 | .2072486 | .0279568 | .1963290 |

|           |          |          |          |          |          |
|-----------|----------|----------|----------|----------|----------|
| Int. Std. | Y_2243   | Y_3600   | Y_3710   | Y_2243   | In2306   |
| Units     | Cts/S    | Cts/S    | Cts/S    | Cts/S    | Cts/S    |
| Avg       | 3358.142 | 70595.31 | 13609.37 | 2370.478 | 4008.387 |
| Stddev    | 5.275    | 680.25   | 56.62    | 20.041   | 3.913    |
| %RSD      | .1570865 | .9635915 | .4160270 | .8454342 | .0976280 |

|    |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|
| #1 | 3359.037 | 70920.25 | 13559.92 | 2384.715 | 4005.895 |
| #2 | 3362.912 | 69813.52 | 13597.07 | 2347.560 | 4012.897 |
| #3 | 3352.477 | 71052.15 | 13671.13 | 2379.157 | 4006.369 |

Sample Name: CCV029      Acquired: 1/29/2025 17:02:27      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: CCV029      Custom ID2:      Custom ID3:  
Comment:

|        |                 |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | As1890          | Tl1908          | Pb2203          | Se1960          | Sb2068          | Al3961          | Ba4934          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>5.138618</b> | <b>4.871049</b> | <b>24.74611</b> | <b>5.106162</b> | <b>5.195191</b> | <b>400.1911</b> | <b>10.57906</b> |
| Stddev | .004666         | .033871         | .01247          | .017924         | .017703         | 8.0587          | .28465          |
| %RSD   | .0908082        | .6953495        | .0504108        | .3510250        | .3407505        | 2.013715        | 2.690697        |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | 5.134306 | 4.834905 | 24.73613 | 5.086391 | 5.180835 | 391.0433 | 10.27558 |
| #2 | 5.137977 | 4.902061 | 24.74211 | 5.110749 | 5.189766 | 406.2419 | 10.84012 |
| #3 | 5.143572 | 4.876181 | 24.76010 | 5.121347 | 5.214971 | 403.2881 | 10.62148 |

|        |                 |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | Be2348          | Cd2144          | Ca3736          | Cr2677          | Co2286          | Cu3247          | Fe2598          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>.4963027</b> | <b>2.491449</b> | <b>406.6289</b> | <b>15.75585</b> | <b>2.507844</b> | <b>15.12346</b> | <b>406.6988</b> |
| Stddev | .0042664        | .002536         | 8.4825          | .36069          | .003415         | .06353          | 6.8989          |
| %RSD   | .8596333        | .1017761        | 2.086056        | 2.289268        | .1361807        | .4200955        | 1.696324        |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | .4914756 | 2.490737 | 399.2950 | 15.35606 | 2.506132 | 15.05011 | 399.0782 |
| #2 | .4978637 | 2.494265 | 415.9184 | 16.05687 | 2.505624 | 15.15972 | 412.5191 |
| #3 | .4995687 | 2.489346 | 404.6731 | 15.85461 | 2.511777 | 15.16057 | 408.4992 |

|        |                 |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | Mn2576          | Mg2790          | Ni2316          | Ag3280          | Na8183          | V_2924          | Zn2138          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>15.54516</b> | <b>402.4020</b> | <b>2.497105</b> | <b>1.316177</b> | <b>388.2909</b> | <b>2.490063</b> | <b>15.86578</b> |
| Stddev | .28424          | 6.4836          | .002375         | .028090         | 1.2989          | .013804         | .43350          |
| %RSD   | 1.828485        | 1.611228        | .0951015        | 2.134229        | .3345215        | .5543536        | 2.732288        |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | 15.24168 | 395.1436 | 2.495763 | 1.285061 | 387.0067 | 2.479007 | 15.42721 |
| #2 | 15.80514 | 407.6198 | 2.495705 | 1.339666 | 388.2620 | 2.485647 | 16.29403 |
| #3 | 15.58867 | 404.4427 | 2.499847 | 1.323804 | 389.6041 | 2.505534 | 15.87611 |

|        |                 |                 |                 |                 |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Elem   | K_7698          | P_1774          | B_2496          | Mo2020          | S_1820          | Si2516          | Sn1899          |
| Units  | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             | ppm             |
| Avg    | <b>164.3148</b> | <b>4.982163</b> | <b>5.396442</b> | <b>5.038787</b> | <b>5.040049</b> | <b>4.890863</b> | <b>4.985871</b> |
| Stddev | 2.9331          | .013057         | .056849         | .013319         | .011868         | .024028         | .009646         |
| %RSD   | 1.785031        | .2620662        | 1.053458        | .2643236        | .2354655        | .4912817        | .1934705        |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | 161.0852 | 4.968407 | 5.330805 | 5.028852 | 5.037419 | 4.864580 | 4.975107 |
| #2 | 166.8129 | 4.983700 | 5.430076 | 5.033587 | 5.053011 | 4.911702 | 4.988773 |
| #3 | 165.0463 | 4.994384 | 5.428445 | 5.053921 | 5.029717 | 4.896306 | 4.993733 |

Sample Name: CCV029      Acquired: 1/29/2025 17:02:27      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: CCV029      Custom ID2:      Custom ID3:  
Comment:

| Elem   | Ti3361   | Li6707   | Sr4077   |
|--------|----------|----------|----------|
| Units  | ppm      | ppm      | ppm      |
| Avg    | 5.007080 | 5.401779 | 5.385030 |
| Stddev | .019205  | .110489  | .104220  |
| %RSD   | .3835628 | 2.045422 | 1.935372 |

|    |          |          |          |
|----|----------|----------|----------|
| #1 | 4.985420 | 5.283238 | 5.280026 |
| #2 | 5.013790 | 5.501902 | 5.488449 |
| #3 | 5.022030 | 5.420196 | 5.386615 |

| Int. Std. | Y_2243   | Y_3600   | Y_3710   | Y_2243   | In2306   |
|-----------|----------|----------|----------|----------|----------|
| Units     | Cts/S    | Cts/S    | Cts/S    | Cts/S    | Cts/S    |
| Avg       | 2767.424 | 59931.80 | 12834.65 | 1943.987 | 3008.578 |
| Stddev    | 6.399    | 1073.69  | 39.64    | 48.667   | 3.297    |
| %RSD      | .2312185 | 1.791527 | .3088727 | 2.503474 | .1095744 |

|    |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|
| #1 | 2769.802 | 61101.51 | 12868.05 | 1994.675 | 3008.553 |
| #2 | 2772.293 | 58991.06 | 12845.06 | 1897.630 | 3011.888 |
| #3 | 2760.177 | 59702.84 | 12790.84 | 1939.657 | 3005.295 |

Sample Name: CCB029      Acquired: 1/29/2025 17:06:45      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: CCB029      Custom ID2:      Custom ID3:  
Comment:

|        |          |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|----------|
| Elem   | As1890   | Tl1908   | Pb2203   | Se1960   | Sb2068   | Al3961   | Ba4934   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | .0005161 | .0004822 | .0004229 | -.000197 | .0002698 | .0028082 | -.000049 |
| Stddev | .0008616 | .0014907 | .0017112 | .000885  | .0025665 | .0040995 | .001067  |
| %RSD   | 166.9242 | 309.1627 | 404.6330 | 448.9100 | 951.1562 | 145.9824 | 2165.134 |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | -.000444 | .0007864 | -.000202 | -.000552 | .0003166 | .0025719 | -.001215 |
| #2 | .000772  | .0017973 | -.000888 | -.000850 | .0028127 | -.001168 | .000188  |
| #3 | .001221  | -.001137 | .002359  | .000811  | -.002320 | .007021  | .000879  |

|        |          |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|----------|
| Elem   | Be2348   | Cd2144   | Ca3736   | Cr2677   | Co2286   | Cu3247   | Fe2598   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | -.000025 | -.000009 | .0126753 | .0002820 | -.000264 | .0006676 | .0012756 |
| Stddev | .000066  | .000085  | .0057133 | .0002602 | .000113  | .0003769 | .0067152 |
| %RSD   | 261.6348 | 986.6360 | 45.07415 | 92.25884 | 42.80054 | 56.45544 | 526.4178 |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | .000045  | .000086  | .0070665 | .0000092 | -.000232 | .0009174 | -.004984 |
| #2 | -.000084 | -.000080 | .0184876 | .0005274 | -.000390 | .0002341 | .008369  |
| #3 | -.000036 | -.000032 | .0124718 | .0003095 | -.000170 | .0008513 | .000442  |

|        |          |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|----------|
| Elem   | Mn2576   | Mg2790   | Ni2316   | Ag3280   | Na8183   | V_2924   | Zn2138   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | -.000044 | .0111232 | -.000005 | -.000039 | .0764491 | .0011841 | .0005432 |
| Stddev | .000074  | .0019353 | .000534  | .000074  | .4911489 | .0017759 | .0012147 |
| %RSD   | 170.6646 | 17.39868 | 11081.35 | 188.9181 | 642.4519 | 149.9798 | 223.6179 |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | -.000063 | .0093486 | .000050  | .000004  | .4575309 | .0031458 | .0016268 |
| #2 | .000039  | .0131867 | -.000564 | -.000125 | -.477836 | -.000314 | .0007726 |
| #3 | -.000106 | .0108343 | .000500  | .000004  | .249652  | .000720  | -.000770 |

|        |          |          |          |          |          |          |          |
|--------|----------|----------|----------|----------|----------|----------|----------|
| Elem   | K_7698   | P_1774   | B_2496   | Mo2020   | S_1820   | Si2516   | Sn1899   |
| Units  | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      | ppm      |
| Avg    | .0886969 | -.001276 | .0023639 | .0002095 | .0066403 | -.000141 | -.000272 |
| Stddev | .0223749 | .000301  | .0004744 | .0003216 | .0024157 | .000466  | .000051  |
| %RSD   | 25.22620 | 23.55349 | 20.06705 | 153.5475 | 36.37993 | 329.2323 | 18.63826 |

|    |          |          |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|----------|----------|
| #1 | .1068021 | -.001365 | .0021266 | -.000140 | .0094218 | -.000597 | -.000330 |
| #2 | .0636823 | -.000941 | .0029100 | .000493  | .0054320 | .000333  | -.000242 |
| #3 | .0956064 | -.001523 | .0020550 | .000276  | .0050671 | -.000160 | -.000243 |

Sample Name: CCB029      Acquired: 1/29/2025 17:06:45      Type: Unk  
Method: EPA SFAM01.0(v59)      Mode: CONC      Corr. Factor: 1.000000  
User: Kareem      Custom ID1: CCB029      Custom ID2:      Custom ID3:  
Comment:

|        |                 |                 |                 |
|--------|-----------------|-----------------|-----------------|
| Elem   | Ti3361          | Li6707          | Sr4077          |
| Units  | ppm             | ppm             | ppm             |
| Avg    | <b>-.000046</b> | <b>.0007411</b> | <b>.0000052</b> |
| Stddev | .000410         | .0005966        | .0000571        |
| %RSD   | 897.9000        | 80.50076        | 1098.683        |

|    |          |          |          |
|----|----------|----------|----------|
| #1 | .000298  | .0012986 | -.000054 |
| #2 | .000065  | .0001119 | .000010  |
| #3 | -.000500 | .0008127 | .000060  |

|           |                 |                 |                 |                 |                 |
|-----------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Int. Std. | Y_2243          | Y_3600          | Y_3710          | Y_2243          | In2306          |
| Units     | Cts/S           | Cts/S           | Cts/S           | Cts/S           | Cts/S           |
| Avg       | <b>3363.619</b> | <b>72843.87</b> | <b>13860.85</b> | <b>2396.212</b> | <b>4111.113</b> |
| Stddev    | 6.179           | 153.73          | 10.39           | 4.343           | 10.825          |
| %RSD      | .1837010        | .2110445        | .0749355        | .1812621        | .2633219        |

|    |          |          |          |          |          |
|----|----------|----------|----------|----------|----------|
| #1 | 3369.820 | 72678.29 | 13852.73 | 2400.212 | 4122.495 |
| #2 | 3357.462 | 72982.07 | 13857.25 | 2391.592 | 4100.947 |
| #3 | 3363.575 | 72871.24 | 13872.55 | 2396.831 | 4109.896 |



## Prep Standard - Chemical Standard Summary

**Order ID :** Q1159  
**Test :** Metals CLP12  
**Prepbatch ID :** PB166301,  
**Sequence ID/Qc Batch ID:** LB134475,

**Standard ID :**  
MP83500,MP84041,MP84063,MP84070,MP84204,MP84206,MP84207,MP84208,MP84209,MP84210,MP 84211,MP84212,MP84213,MP84214,MP84215,MP84216,MP84218,MP84219,

**Chemical ID :**  
M5130,M5218,M5223,M5289,M5295,M5298,M5393,M5429,M5466,M5472,M5476,M5496,M5497,M5513,M5519,M5565,M5658,M5697,M5798,M5799,M5800,M5801,M5802,M5806,M5815,M5817,M5819,M5875,M5942,M5959,M5961,M5962,M5976,M5977,M5978,M5985,M5990,M6021,M6023,M6025,M6028,M6030,M6032,M6077,M6121,M6125,M6126,M6127,M6128,M6144,W3112,

## Metals STANDARD PREPARATION LOG

| <u>Recipe ID</u> | <u>NAME</u>                   | <u>NO.</u>              | <u>Prep Date</u> | <u>Expiration Date</u> | <u>Prepared By</u> | <u>ScaleID</u> | <u>PipetteID</u> | <u>Supervised By</u> |
|------------------|-------------------------------|-------------------------|------------------|------------------------|--------------------|----------------|------------------|----------------------|
| 902              | ICP AES CAL BLK ( SO/ICB/CCB) | <a href="#">MP83500</a> | 12/06/2024       | 01/24/2025             | Kareem Khairalla   | None           | None             | Sarabjit Jaswal      |
|                  |                               |                         |                  |                        |                    |                |                  | 12/09/2024           |

**FROM** 125.00000ml of M6121 + 2350.00000ml of W3112 + 25.00000ml of M6126 = Final Quantity: 2500.000 ml

| <u>Recipe ID</u> | <u>NAME</u> | <u>NO.</u>              | <u>Prep Date</u> | <u>Expiration Date</u> | <u>Prepared By</u> | <u>ScaleID</u> | <u>PipetteID</u> | <u>Supervised By</u> |
|------------------|-------------|-------------------------|------------------|------------------------|--------------------|----------------|------------------|----------------------|
| 169              | 1:1HNO3     | <a href="#">MP84041</a> | 01/14/2025       | 07/14/2025             | Eman Mughal        | None           | None             | Sarabjit Jaswal      |
|                  |             |                         |                  |                        |                    |                |                  | 01/16/2025           |

**FROM** 1250.00000ml of M6126 + 1250.00000ml of W3112 = Final Quantity: 2500.000 ml

## Metals STANDARD PREPARATION LOG

| <u>Recipe ID</u> | <u>NAME</u>               | <u>NO.</u>              | <u>Prep Date</u> | <u>Expiration Date</u> | <u>Prepared By</u> | <u>ScaleID</u> | <u>PipetteID</u> | <u>Supervised By</u> |
|------------------|---------------------------|-------------------------|------------------|------------------------|--------------------|----------------|------------------|----------------------|
| 994              | ICPAES ISM01.2 S1 (CONC.) | <a href="#">MP84063</a> | 01/14/2025       | 02/14/2025             | Kareem Khairalla   | None           | None             | Sarabjit Jaswal      |
|                  |                           |                         |                  |                        |                    |                |                  | 01/16/2025           |

**FROM** 0.02000ml of M5815 + 0.03000ml of M5429 + 0.10000ml of M5798 + 0.10000ml of M6028 + 0.14000ml of M5799 + 0.20000ml of M5298 + 0.20000ml of M5476 + 0.20000ml of M5658 + 0.20000ml of M5801 + 0.20000ml of M5817 + 0.20000ml of M5976 + 0.20000ml of M6025 + 0.20000ml of M6030 + 0.30000ml of M6128 + 0.40000ml of M5496 + 0.50000ml of M5697 + 0.50000ml of M6023 + 0.70000ml of M5962 + 0.80000ml of M5961 + 1.00000ml of M5800 + 1.00000ml of M6021 + 1.20000ml of M5802 + 1.20000ml of M5819 + 10.00000ml of M5497 + 10.00000ml of M5519 + 10.00000ml of M5806 + 10.00000ml of M6127 + 2.00000ml of M5942 + 4.00000ml of M6032 + 34.24000ml of MP83500 = Final Quantity: 100.000 ml

| <u>Recipe ID</u> | <u>NAME</u>        | <u>NO.</u>              | <u>Prep Date</u> | <u>Expiration Date</u> | <u>Prepared By</u> | <u>ScaleID</u> | <u>PipetteID</u> | <u>Supervised By</u> |
|------------------|--------------------|-------------------------|------------------|------------------------|--------------------|----------------|------------------|----------------------|
| 921              | ICPAES SPIKE SOL#6 | <a href="#">MP84070</a> | 01/14/2025       | 02/14/2025             | Kareem Khairalla   | None           | None             | Sarabjit Jaswal      |
|                  |                    |                         |                  |                        |                    |                |                  | 01/16/2025           |

**FROM** 2.50000ml of M5962 + 50.00000ml of M5565 + 50.00000ml of M5990 + 147.50000ml of MP83500 = Final Quantity: 250.000 ml

## Metals STANDARD PREPARATION LOG

| <u>Recipe ID</u> | <u>NAME</u>                   | <u>NO.</u>              | <u>Prep Date</u> | <u>Expiration Date</u> | <u>Prepared By</u> | <u>ScaleID</u> | <u>PipetteID</u> | <u>Supervised By</u> |
|------------------|-------------------------------|-------------------------|------------------|------------------------|--------------------|----------------|------------------|----------------------|
| 902              | ICP AES CAL BLK ( SO/ICB/CCB) | <a href="#">MP84204</a> | 01/24/2025       | 02/24/2025             | Kareem Khairalla   | None           | None             | Sarabjit Jaswal      |
|                  |                               |                         |                  |                        |                    |                |                  | 01/27/2025           |

**FROM** 125.00000ml of M6121 + 2350.00000ml of W3112 + 25.00000ml of M6126 = Final Quantity: 2500.000 ml

| <u>Recipe ID</u> | <u>NAME</u>           | <u>NO.</u>              | <u>Prep Date</u> | <u>Expiration Date</u> | <u>Prepared By</u> | <u>ScaleID</u> | <u>PipetteID</u> | <u>Supervised By</u> |
|------------------|-----------------------|-------------------------|------------------|------------------------|--------------------|----------------|------------------|----------------------|
| 2480             | ICP AES STD 6 ISM01.3 | <a href="#">MP84206</a> | 01/24/2025       | 02/04/2025             | Kareem Khairalla   | None           | None             | Sarabjit Jaswal      |
|                  |                       |                         |                  |                        |                    |                |                  | 01/27/2025           |

**FROM** 4.00000ml of M5289 + 4.00000ml of M5298 + 4.00000ml of M5497 + 4.00000ml of M6127 + 4.00000ml of M6144 + 30.00000ml of MP84204 = Final Quantity: 50.000 ml

## Metals STANDARD PREPARATION LOG

| <u>Recipe ID</u> | <u>NAME</u>         | <u>NO.</u>              | <u>Prep Date</u> | <u>Expiration Date</u> | <u>Prepared By</u> | <u>ScaleID</u> | <u>PipetteID</u> | <u>Supervised By</u> |
|------------------|---------------------|-------------------------|------------------|------------------------|--------------------|----------------|------------------|----------------------|
| 1004             | ICPAES ISM01.2 (S5) | <a href="#">MP84207</a> | 01/24/2025       | 02/04/2025             | Kareem Khairalla   | None           | None             | Sarabjit Jaswal      |
|                  |                     |                         |                  |                        |                    |                |                  | 01/27/2025           |

**FROM** 0.25000ml of M5798 + 0.50000ml of M5429 + 0.50000ml of M5476 + 0.50000ml of M5815 + 0.50000ml of M5817 + 12.50000ml of M5519 + 12.50000ml of M5819 + 12.50000ml of M6128 + 12.50000ml of M6144 + 13.75000ml of M5697 + 14.50000ml of M5298 + 14.50000ml of M5496 + 14.50000ml of M5658 + 2.00000ml of M5513 + 22.50000ml of M5497 + 22.50000ml of M6127 + 5.00000ml of M5393 + 5.00000ml of M5802 + 5.00000ml of M5875 + 5.00000ml of M6077 + 303.50000ml of MP84204 =  
Final Quantity: 500.000 ml

| <u>Recipe ID</u> | <u>NAME</u>        | <u>NO.</u>              | <u>Prep Date</u> | <u>Expiration Date</u> | <u>Prepared By</u> | <u>ScaleID</u> | <u>PipetteID</u> | <u>Supervised By</u> |
|------------------|--------------------|-------------------------|------------------|------------------------|--------------------|----------------|------------------|----------------------|
| 1005             | ICPAES ISM01.2(S4) | <a href="#">MP84208</a> | 01/24/2025       | 02/04/2025             | Kareem Khairalla   | None           | None             | Sarabjit Jaswal      |
|                  |                    |                         |                  |                        |                    |                |                  | 01/27/2025           |

**FROM** 250.00000ml of MP84204 + 250.00000ml of MP84207 = Final Quantity: 500.000 ml

## Metals STANDARD PREPARATION LOG

| <u>Recipe ID</u> | <u>NAME</u>        | <u>NO.</u>              | <u>Prep Date</u> | <u>Expiration Date</u> | <u>Prepared By</u> | <u>ScaleID</u> | <u>PipetteID</u> | <u>Supervised By</u> |
|------------------|--------------------|-------------------------|------------------|------------------------|--------------------|----------------|------------------|----------------------|
| 1007             | ICPAES ISM01.2(S3) | <a href="#">MP84209</a> | 01/24/2025       | 02/04/2025             | Kareem Khairalla   | None           | None             | Sarabjit Jaswal      |
|                  |                    |                         |                  |                        |                    |                |                  | 01/27/2025           |

**FROM** 25.00000ml of MP84207 + 75.00000ml of MP84204 = Final Quantity: 100.000 ml

| <u>Recipe ID</u> | <u>NAME</u>        | <u>NO.</u>              | <u>Prep Date</u> | <u>Expiration Date</u> | <u>Prepared By</u> | <u>ScaleID</u> | <u>PipetteID</u> | <u>Supervised By</u> |
|------------------|--------------------|-------------------------|------------------|------------------------|--------------------|----------------|------------------|----------------------|
| 1008             | ICPAES ISM01.2(S2) | <a href="#">MP84210</a> | 01/24/2025       | 02/04/2025             | Kareem Khairalla   | None           | None             | Sarabjit Jaswal      |
|                  |                    |                         |                  |                        |                    |                |                  | 01/27/2025           |

**FROM** 12.50000ml of MP84207 + 87.50000ml of MP84204 = Final Quantity: 100.000 ml

## Metals STANDARD PREPARATION LOG

| <u>Recipe ID</u> | <u>NAME</u>               | <u>NO.</u>              | <u>Prep Date</u> | <u>Expiration Date</u> | <u>Prepared By</u> | <u>ScaleID</u> | <u>PipetteID</u> | <u>Supervised By</u> |
|------------------|---------------------------|-------------------------|------------------|------------------------|--------------------|----------------|------------------|----------------------|
| 994              | ICPAES ISM01.2 S1 (CONC.) | <a href="#">MP84211</a> | 01/24/2025       | 02/04/2025             | Kareem Khairalla   | None           | None             | Sarabjit Jaswal      |
|                  |                           |                         |                  |                        |                    |                |                  | 01/27/2025           |

**FROM** 0.02000ml of M5815 + 0.03000ml of M5429 + 0.10000ml of M5798 + 0.10000ml of M6028 + 0.14000ml of M5799 + 0.20000ml of M5298 + 0.20000ml of M5476 + 0.20000ml of M5658 + 0.20000ml of M5801 + 0.20000ml of M5817 + 0.20000ml of M5977 + 0.20000ml of M6025 + 0.20000ml of M6030 + 0.30000ml of M6128 + 0.40000ml of M5496 + 0.50000ml of M5697 + 0.50000ml of M6023 + 0.70000ml of M5962 + 0.80000ml of M5961 + 1.00000ml of M5800 + 1.00000ml of M6021 + 1.20000ml of M5802 + 1.20000ml of M5819 + 10.00000ml of M5497 + 10.00000ml of M5519 + 10.00000ml of M6127 + 10.00000ml of M6144 + 2.00000ml of M5978 + 4.00000ml of M6032 + 34.24000ml of MP84204 = Final Quantity: 100.000 ml

| <u>Recipe ID</u> | <u>NAME</u>       | <u>NO.</u>              | <u>Prep Date</u> | <u>Expiration Date</u> | <u>Prepared By</u> | <u>ScaleID</u> | <u>PipetteID</u> | <u>Supervised By</u> |
|------------------|-------------------|-------------------------|------------------|------------------------|--------------------|----------------|------------------|----------------------|
| 1003             | ICPAES ISM01.2 S1 | <a href="#">MP84212</a> | 01/24/2025       | 02/04/2025             | Kareem Khairalla   | None           | None             | Sarabjit Jaswal      |
|                  |                   |                         |                  |                        |                    |                |                  | 01/27/2025           |

**FROM** 0.50000ml of MP84211 + 99.50000ml of MP84204 = Final Quantity: 100.000 ml



| <u>Recipe ID</u> | <u>NAME</u>      | <u>NO.</u>              | <u>Prep Date</u> | <u>Expiration Date</u> | <u>Prepared By</u> | <u>ScaleID</u> | <u>PipetteID</u> | <u>Supervised By</u>          |
|------------------|------------------|-------------------------|------------------|------------------------|--------------------|----------------|------------------|-------------------------------|
| 912              | ICP AES ICV SOLN | <a href="#">MP84213</a> | 01/24/2025       | 02/05/2025             | Kareem Khairalla   | None           | None             | Sarabjit Jaswal<br>01/27/2025 |

|             |                                                                                                                                                                                                        |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>FROM</b> | 0.02500ml of M5429 + 0.02500ml of M5815 + 0.02500ml of M5817 + 0.10000ml of M5466 + 0.25000ml of M5218 + 0.25000ml of M5472 + 10.00000ml of M5295 + 89.77500ml of MP84204 = Final Quantity: 100.000 ml |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| FROM                                         |                              |
|----------------------------------------------|------------------------------|
| 25.00000ml of M5130 + 225.00000ml of MP84204 | = Final Quantity: 250.000 ml |



## Metals STANDARD PREPARATION LOG

| <u>Recipe ID</u> | <u>NAME</u>        | <u>NO.</u>              | <u>Prep Date</u> | <u>Expiration Date</u> | <u>Prepared By</u>  | <u>ScaleID</u> | <u>PipetteID</u> | <u>Supervised By</u>              |
|------------------|--------------------|-------------------------|------------------|------------------------|---------------------|----------------|------------------|-----------------------------------|
| 905              | ICP AES ICSAB SOLN | <a href="#">MP84215</a> | 01/24/2025       | 02/07/2025             | Kareem<br>Khairalla | None           | None             | Sarabjit Jaswal<br><br>01/27/2025 |

**FROM** 25.00000ml of M5130 + 25.00000ml of M5223 + 200.00000ml of MP84204 = Final Quantity: 250.000 ml

| <u>Recipe ID</u> | <u>NAME</u>         | <u>NO.</u>              | <u>Prep Date</u> | <u>Expiration Date</u> | <u>Prepared By</u>  | <u>ScaleID</u> | <u>PipetteID</u> | <u>Supervised By</u>              |
|------------------|---------------------|-------------------------|------------------|------------------------|---------------------|----------------|------------------|-----------------------------------|
| 1119             | ICPAES ISM01.2(CCV) | <a href="#">MP84216</a> | 01/24/2025       | 02/04/2025             | Kareem<br>Khairalla | None           | None             | Sarabjit Jaswal<br><br>01/27/2025 |

**FROM** 0.75000ml of M5497 + 0.75000ml of M6127 + 1.22500ml of M5496 + 1.25000ml of M5298 + 1.25000ml of M6144 + 19.77500ml of MP84204 + 25.00000ml of MP84207 = Final Quantity: 50.000 ml

## Metals STANDARD PREPARATION LOG

| <u>Recipe ID</u> | <u>NAME</u>          | <u>NO.</u>              | <u>Prep Date</u> | <u>Expiration Date</u> | <u>Prepared By</u>  | <u>ScaleID</u> | <u>PipetteID</u> | <u>Supervised By</u>              |
|------------------|----------------------|-------------------------|------------------|------------------------|---------------------|----------------|------------------|-----------------------------------|
| 919              | ICP AES INTERNAL STD | <a href="#">MP84218</a> | 01/24/2025       | 02/24/2025             | Kareem<br>Khairalla | None           | None             | Sarabjit Jaswal<br><br>01/27/2025 |

**FROM** 1.00000ml of M5959 + 10.00000ml of M5985 + 1969.00000ml of W3112 + 20.00000ml of M6126 = Final Quantity: 2000.000 ml

| <u>Recipe ID</u> | <u>NAME</u>        | <u>NO.</u>              | <u>Prep Date</u> | <u>Expiration Date</u> | <u>Prepared By</u>  | <u>ScaleID</u> | <u>PipetteID</u> | <u>Supervised By</u>              |
|------------------|--------------------|-------------------------|------------------|------------------------|---------------------|----------------|------------------|-----------------------------------|
| 903              | ICP AES RINSE SOLN | <a href="#">MP84219</a> | 01/24/2025       | 02/24/2025             | Kareem<br>Khairalla | None           | None             | Sarabjit Jaswal<br><br>01/27/2025 |

**FROM** 200.00000ml of M6126 + 9800.00000ml of W3112 = Final Quantity: 10000.000 ml

## CHEMICAL RECEIPT LOG BOOK

| Supplier | ItemCode / ItemName                 | Lot #     | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|----------|-------------------------------------|-----------|-----------------|-------------------------|-----------------------------|----------------|
| EPA      | PART A / ICSA ( ICP )<br>STOCK SOLN | ICSA-1211 | 01/31/2025      | 05/20/2024 /<br>jaswal  | 04/20/2021 /<br>bin         | M5130          |

| Supplier           | ItemCode / ItemName                                                          | Lot #        | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------|------------------------------------------------------------------------------|--------------|-----------------|-------------------------|-----------------------------|----------------|
| Inorganic Ventures | CHEM-QC-4 /<br>CHEM-QC-4, Second<br>Source, 1000 ug/ml, B, Mo,<br>Si, Sn, Ti | S2-MEB711674 | 11/02/2026      | 07/01/2022 /<br>bin     | 09/10/2021 /<br>bin         | M5218          |

| Supplier | ItemCode / ItemName                  | Lot #     | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|----------|--------------------------------------|-----------|-----------------|-------------------------|-----------------------------|----------------|
| EPA      | PART B / ICSAB ( ICP )<br>STOCK SOLN | ICSB-0710 | 01/31/2025      | 05/20/2024 /<br>jaswal  | 04/20/2021 /<br>bin         | M5223          |

| Supplier                 | ItemCode / ItemName                | Lot #  | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------|------------------------------------|--------|-----------------|-------------------------|-----------------------------|----------------|
| Absolute Standards, Inc. | 58113 / Aluminum (Al)<br>10,000PPM | 070622 | 07/06/2025      | 09/02/2022 /<br>jaswal  | 07/12/2022 /<br>jaswal      | M5289          |

| Supplier | ItemCode / ItemName                     | Lot #    | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|----------|-----------------------------------------|----------|-----------------|-------------------------|-----------------------------|----------------|
| EPA      | ICV-1 / ICV ( ICP/ICPMS )<br>STOCK SOLN | ICV-1014 | 02/05/2025      | 08/07/2024 /<br>jaswal  | 04/20/2021 /<br>bin         | M5295          |

| Supplier                 | ItemCode / ItemName              | Lot #  | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------|----------------------------------|--------|-----------------|-------------------------|-----------------------------|----------------|
| Absolute Standards, Inc. | 58126 / Fe, 10000 PPM,<br>500 ml | 020422 | 02/04/2025      | 05/02/2023 /<br>jaswal  | 06/15/2022 /<br>jaswal      | M5298          |

## CHEMICAL RECEIPT LOG BOOK

| Supplier           | ItemCode / ItemName                     | Lot #        | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------|-----------------------------------------|--------------|-----------------|-------------------------|-----------------------------|----------------|
| Inorganic Ventures | CLPP-CAL-3 / CLP CAL SOLUTION #3, 125mL | T2-MEB714159 | 01/13/2027      | 10/12/2022 / bin        | 09/19/2022 / bin            | M5393          |

| Supplier                 | ItemCode / ItemName           | Lot #  | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------|-------------------------------|--------|-----------------|-------------------------|-----------------------------|----------------|
| Absolute Standards, Inc. | 57103 / Li, 10000 PPM, 125 ml | 070622 | 07/06/2025      | 01/30/2023 / bin        | 01/26/2023 / bin            | M5429          |

| Supplier                 | ItemCode / ItemName            | Lot #  | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------|--------------------------------|--------|-----------------|-------------------------|-----------------------------|----------------|
| Absolute Standards, Inc. | 57058 / Cerium, 1000PPM, 100ML | 061322 | 06/13/2025      | 03/06/2023 / bin        | 03/01/2023 / bin            | M5466          |

| Supplier                 | ItemCode / ItemName          | Lot #  | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------|------------------------------|--------|-----------------|-------------------------|-----------------------------|----------------|
| Absolute Standards, Inc. | 57038 / Sr, 1000 PPM, 125 ml | 082922 | 08/29/2025      | 01/14/2025 / Jaswal     | 03/16/2023 / jaswal         | M5472          |

| Supplier                 | ItemCode / ItemName           | Lot #  | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------|-------------------------------|--------|-----------------|-------------------------|-----------------------------|----------------|
| Absolute Standards, Inc. | 57138 / Sr, 10000 PPM, 125 ml | 082922 | 08/29/2025      | 07/29/2024 / jaswal     | 03/16/2023 / jaswal         | M5476          |

| Supplier                 | ItemCode / ItemName           | Lot #  | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------|-------------------------------|--------|-----------------|-------------------------|-----------------------------|----------------|
| Absolute Standards, Inc. | 58113 / Al, 10000 PPM, 500 ml | 011623 | 01/16/2026      | 08/15/2023 / jaswal     | 03/17/2023 / bin            | M5496          |

## CHEMICAL RECEIPT LOG BOOK

| Supplier                 | ItemCode / ItemName           | Lot #  | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------|-------------------------------|--------|-----------------|-------------------------|-----------------------------|----------------|
| Absolute Standards, Inc. | 58120 / Ca, 10000 PPM, 500 ml | 031523 | 03/15/2026      | 03/18/2023 / bin        | 03/17/2023 / bin            | M5497          |

| Supplier                 | ItemCode / ItemName           | Lot #  | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------|-------------------------------|--------|-----------------|-------------------------|-----------------------------|----------------|
| Absolute Standards, Inc. | 57182 / Pb, 10000 PPM, 125 ml | 061522 | 06/15/2025      | 03/19/2023 / bin        | 03/17/2023 / bin            | M5513          |

| Supplier                 | ItemCode / ItemName             | Lot #  | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------|---------------------------------|--------|-----------------|-------------------------|-----------------------------|----------------|
| Absolute Standards, Inc. | 57119 / Potassium (K) 10,000PPM | 120822 | 12/08/2025      | 01/08/2024 / bin        | 03/17/2023 / bin            | M5519          |

| Supplier           | ItemCode / ItemName                         | Lot #        | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------|---------------------------------------------|--------------|-----------------|-------------------------|-----------------------------|----------------|
| Inorganic Ventures | CLPP-SPK-1 / SOIL/WATER SPIKE SOLN 1, 125mL | T2-MEB721963 | 07/27/2027      | 05/30/2023 / jaswal     | 05/26/2023 / jaswal         | M5565          |

| Supplier                 | ItemCode / ItemName                    | Lot #  | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------|----------------------------------------|--------|-----------------|-------------------------|-----------------------------|----------------|
| Absolute Standards, Inc. | 58024 / Chromium, Cr, 500 ml, 1000 PPM | 060523 | 06/05/2026      | 08/28/2023 / jaswal     | 08/25/2023 / jaswal         | M5658          |

| Supplier                 | ItemCode / ItemName          | Lot #  | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------|------------------------------|--------|-----------------|-------------------------|-----------------------------|----------------|
| Absolute Standards, Inc. | 58029 / Cu, 1000 PPM, 500 ml | 102523 | 10/25/2026      | 04/03/2024 / jaswal     | 10/27/2023 / jaswal         | M5697          |

## CHEMICAL RECEIPT LOG BOOK

| Supplier                 | ItemCode / ItemName          | Lot #  | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------|------------------------------|--------|-----------------|-------------------------|-----------------------------|----------------|
| Absolute Standards, Inc. | 57004 / Be, 1000 PPM, 125 ml | 102523 | 10/25/2026      | 02/09/2024 / bin        | 02/09/2024 / bin            | M5798          |

| Supplier                 | ItemCode / ItemName          | Lot #  | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------|------------------------------|--------|-----------------|-------------------------|-----------------------------|----------------|
| Absolute Standards, Inc. | 57050 / Sn, 1000 PPM, 125 ml | 071123 | 07/11/2026      | 02/09/2024 / bin        | 02/09/2024 / bin            | M5799          |

| Supplier                 | ItemCode / ItemName          | Lot #  | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------|------------------------------|--------|-----------------|-------------------------|-----------------------------|----------------|
| Absolute Standards, Inc. | 57027 / CO, 1000 PPM, 125 ml | 091923 | 09/19/2026      | 05/31/2024 / bin        | 02/09/2024 / bin            | M5800          |

| Supplier                 | ItemCode / ItemName          | Lot #  | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------|------------------------------|--------|-----------------|-------------------------|-----------------------------|----------------|
| Absolute Standards, Inc. | 57033 / As, 1000 PPM, 125 ml | 111323 | 11/13/2026      | 02/09/2024 / bin        | 02/09/2024 / bin            | M5801          |

| Supplier                 | ItemCode / ItemName          | Lot #  | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------|------------------------------|--------|-----------------|-------------------------|-----------------------------|----------------|
| Absolute Standards, Inc. | 57051 / Sb, 1000 PPM, 125 ml | 120523 | 12/05/2026      | 08/07/2024 / jaswal     | 01/03/2024 / jaswal         | M5802          |

| Supplier                 | ItemCode / ItemName           | Lot #  | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------|-------------------------------|--------|-----------------|-------------------------|-----------------------------|----------------|
| Absolute Standards, Inc. | 58111 / Na, 10000 PPM, 500 ml | 122223 | 12/22/2026      | 08/01/2024 / Jaswal     | 01/03/2024 / jaswal         | M5806          |

## CHEMICAL RECEIPT LOG BOOK

| Supplier                 | ItemCode / ItemName          | Lot #  | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------|------------------------------|--------|-----------------|-------------------------|-----------------------------|----------------|
| Absolute Standards, Inc. | 57115 / P, 10000 PPM, 125 ml | 041723 | 04/17/2026      | 05/21/2024 / Jaswal     | 02/09/2024 / jaswal         | M5815          |

| Supplier                 | ItemCode / ItemName          | Lot #  | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------|------------------------------|--------|-----------------|-------------------------|-----------------------------|----------------|
| Absolute Standards, Inc. | 57116 / S, 10000 PPM, 125 ml | 071123 | 07/11/2026      | 03/01/2024 / jaswal     | 02/09/2024 / jaswal         | M5817          |

| Supplier                 | ItemCode / ItemName                | Lot #  | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------|------------------------------------|--------|-----------------|-------------------------|-----------------------------|----------------|
| Absolute Standards, Inc. | 58030 / Zinc, Zn, 500 ml, 1000 PPM | 111623 | 11/16/2026      | 03/20/2024 / jaswal     | 02/09/2024 / jaswal         | M5819          |

| Supplier           | ItemCode / ItemName                     | Lot #        | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------|-----------------------------------------|--------------|-----------------|-------------------------|-----------------------------|----------------|
| Inorganic Ventures | CLPP-CAL-1 / CLP CAL SOLUTION #1, 125mL | T2-MEB714417 | 01/27/2027      | 04/19/2024 / jaswal     | 02/22/2024 / jaswal         | M5875          |

| Supplier           | ItemCode / ItemName                | Lot #       | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------|------------------------------------|-------------|-----------------|-------------------------|-----------------------------|----------------|
| Inorganic Ventures | CGT11-1 / TITANIUM 125mL 1000ug/mL | T2-TI719972 | 06/17/2027      | 06/18/2024 / Jaswal     | 02/22/2024 / Jaswal         | M5942          |

| Supplier           | ItemCode / ItemName                 | Lot #      | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------|-------------------------------------|------------|-----------------|-------------------------|-----------------------------|----------------|
| Inorganic Ventures | CGY10-1 / YTTRIUM 125mL 10,000ug/mL | V2-Y740548 | 02/20/2029      | 07/01/2024 / Jaswal     | 06/14/2024 / Jaswal         | M5959          |

## CHEMICAL RECEIPT LOG BOOK

| Supplier                 | ItemCode / ItemName          | Lot #  | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------|------------------------------|--------|-----------------|-------------------------|-----------------------------|----------------|
| Absolute Standards, Inc. | 57028 / Ni, 1000 PPM, 125 ml | 041124 | 04/11/2027      | 07/02/2024 / Jaswal     | 06/11/2024 / Jaswal         | M5961          |

| Supplier                 | ItemCode / ItemName          | Lot #  | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------|------------------------------|--------|-----------------|-------------------------|-----------------------------|----------------|
| Absolute Standards, Inc. | 57034 / Se, 1000 PPM, 125 ml | 060624 | 06/06/2027      | 07/02/2024 / Jaswal     | 06/14/2024 / Jaswal         | M5962          |

| Supplier           | ItemCode / ItemName                  | Lot #       | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------|--------------------------------------|-------------|-----------------|-------------------------|-----------------------------|----------------|
| Inorganic Ventures | CGMO1-1 / MOLYBDENUM 125mL 1000ug/mL | T2-MO720876 | 07/17/2027      | 08/07/2024 / jaswal     | 02/22/2024 / Jaswal         | M5976          |

| Supplier           | ItemCode / ItemName                  | Lot #       | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------|--------------------------------------|-------------|-----------------|-------------------------|-----------------------------|----------------|
| Inorganic Ventures | CGMO1-1 / MOLYBDENUM 125mL 1000ug/mL | T2-MO720876 | 07/17/2027      | 01/16/2025 / JANVI      | 02/22/2024 / Jaswal         | M5977          |

| Supplier           | ItemCode / ItemName                | Lot #       | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------|------------------------------------|-------------|-----------------|-------------------------|-----------------------------|----------------|
| Inorganic Ventures | CGT11-1 / TITANIUM 125mL 1000ug/mL | T2-TI719972 | 06/17/2027      | 08/07/2024 / jaswal     | 02/22/2024 / Jaswal         | M5978          |

| Supplier           | ItemCode / ItemName          | Lot #       | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------|------------------------------|-------------|-----------------|-------------------------|-----------------------------|----------------|
| Inorganic Ventures | CGIN10-5 / INDIUM 1 x 500 ml | U2-IN729349 | 02/21/2028      | 10/08/2024 / Jaswal     | 06/14/2024 / Jaswal         | M5985          |



## CHEMICAL RECEIPT LOG BOOK

| Supplier           | ItemCode / ItemName               | Lot #        | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------|-----------------------------------|--------------|-----------------|-------------------------|-----------------------------|----------------|
| Inorganic Ventures | CLPP-SPK-5 / CLP Spike Standard 5 | V2-MEB742037 | 03/12/2029      | 10/04/2024 / Jaswal     | 02/22/2024 / Jaswal         | M5990          |

| Supplier                 | ItemCode / ItemName         | Lot #  | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------|-----------------------------|--------|-----------------|-------------------------|-----------------------------|----------------|
| Absolute Standards, Inc. | 57023 / V, 1000 PPM, 125 ml | 062424 | 06/24/2027      | 09/28/2024 / jaswal     | 08/05/2024 / Jaswal         | M6021          |

| Supplier                 | ItemCode / ItemName          | Lot #   | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------|------------------------------|---------|-----------------|-------------------------|-----------------------------|----------------|
| Absolute Standards, Inc. | 57081 / TI, 1000 PPM, 125 ml | 0624724 | 06/27/2027      | 08/05/2024 / kareem     | 08/05/2024 / Jaswal         | M6023          |

| Supplier                 | ItemCode / ItemName          | Lot #  | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------|------------------------------|--------|-----------------|-------------------------|-----------------------------|----------------|
| Absolute Standards, Inc. | 57082 / Pb, 1000 PPM, 125 ml | 061224 | 11/09/2026      | 08/05/2024 / Jaswal     | 08/05/2024 / Jaswal         | M6025          |

| Supplier                 | ItemCode / ItemName          | Lot #  | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------|------------------------------|--------|-----------------|-------------------------|-----------------------------|----------------|
| Absolute Standards, Inc. | 57048 / Cd, 1000 PPM, 125 ml | 070124 | 07/01/2027      | 08/05/2024 / kareem     | 08/05/2024 / Jaswal         | M6028          |

| Supplier                 | ItemCode / ItemName          | Lot #  | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------|------------------------------|--------|-----------------|-------------------------|-----------------------------|----------------|
| Absolute Standards, Inc. | 57047 / Ag, 1000 PPM, 125 ml | 122823 | 12/28/2026      | 08/05/2024 / kareem     | 08/05/2024 / Jaswal         | M6030          |

## CHEMICAL RECEIPT LOG BOOK

| Supplier                 | ItemCode / ItemName          | Lot #  | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------|------------------------------|--------|-----------------|-------------------------|-----------------------------|----------------|
| Absolute Standards, Inc. | 57056 / Ba, 1000 PPM, 125 ml | 010924 | 01/09/2027      | 01/14/2025 / Jaswal     | 08/05/2024 / Jaswal         | M6032          |

| Supplier           | ItemCode / ItemName      | Lot #        | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------|--------------------------|--------------|-----------------|-------------------------|-----------------------------|----------------|
| Inorganic Ventures | Z9651Q / CHEM-CLP-4/.25L | V2-MEB746762 | 09/06/2029      | 01/23/2025 / kareem     | 09/19/2024 / kareem         | M6077          |

| Supplier         | ItemCode / ItemName                                         | Lot #      | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|------------------|-------------------------------------------------------------|------------|-----------------|-------------------------|-----------------------------|----------------|
| Seidler Chemical | BA-9530-33 / Hydrochloric Acid, Instra-Analyzed (cs/6x2.5L) | 0000275677 | 05/13/2025      | 11/13/2024 / Eman       | 10/13/2024 / Eman           | M6121          |

| Supplier                    | ItemCode / ItemName                 | Lot #  | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|-----------------------------|-------------------------------------|--------|-----------------|-------------------------|-----------------------------|----------------|
| PCI Scientific Supply, Inc. | 1403 / Hydrogen Peroxide, 30% 1 gal | 820803 | 05/25/2025      | 11/26/2024 / Eman       | 11/22/2024 / Eman           | M6125          |

| Supplier         | ItemCode / ItemName                                   | Lot #      | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|------------------|-------------------------------------------------------|------------|-----------------|-------------------------|-----------------------------|----------------|
| Seidler Chemical | BA-9598-34 / Nitric Acid, Instra-Analyzed (cs/4x2.5L) | 24D1062002 | 06/03/2025      | 12/03/2024 / Janvi      | 11/12/2024 / Janvi          | M6126          |

| Supplier                 | ItemCode / ItemName           | Lot #  | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------|-------------------------------|--------|-----------------|-------------------------|-----------------------------|----------------|
| Absolute Standards, Inc. | 58112 / Mg, 10000 PPM, 500 ml | 112124 | 11/21/2027      | 01/13/2025 / kareem     | 01/13/2025 / kareem         | M6127          |

## CHEMICAL RECEIPT LOG BOOK

| Supplier                 | ItemCode / ItemName          | Lot #  | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------|------------------------------|--------|-----------------|-------------------------|-----------------------------|----------------|
| Absolute Standards, Inc. | 58025 / Mn, 1000 PPM, 500 ml | 101124 | 10/11/2027      | 01/13/2025 / kareem     | 01/13/2025 / kareem         | M6128          |

| Supplier                 | ItemCode / ItemName           | Lot #  | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------|-------------------------------|--------|-----------------|-------------------------|-----------------------------|----------------|
| Absolute Standards, Inc. | 58111 / Na, 10000 PPM, 500 ml | 072424 | 07/24/2027      | 01/23/2025 / kareem     | 01/13/2025 / Jaswal         | M6144          |

| Supplier         | ItemCode / ItemName | Lot #               | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|------------------|---------------------|---------------------|-----------------|-------------------------|-----------------------------|----------------|
| Seidler Chemical | DIW / DI Water      | Daily Lab-Certified | 07/03/2029      | 07/03/2024 / lwona      | 07/03/2024 / lwona          | W3112          |

# Certificate of Analysis

R: 02/22/24 M5986, M5987, M5988, M5989, M5990

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 Christiansburg, VA 24073 USA  
 inorganicventures.com

P: 800-669-6799/540-585-3030

F: 540-585-3012

info@inorganicventures.com

## 1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



## 2.0 PRODUCT DESCRIPTION

Product Code: Multi Analyte Custom Grade Solution  
 Catalog Number: CLPP-SPK-5  
 Lot Number: V2-MEB742037  
 Matrix: 5% (v/v) HNO<sub>3</sub>  
 Value / Analyte(s):  
     100 µg/mL ea:  
     Antimony,  
     50 µg/mL ea:  
     Selenium, Thallium,  
     Cadmium,  
     40 µg/mL ea:  
     Arsenic,  
     20 µg/mL ea:  
     Lead

## 3.0 CERTIFIED VALUES AND UNCERTAINTIES

| ANALYTE      | CERTIFIED VALUE    | ANALYTE      | CERTIFIED VALUE    |
|--------------|--------------------|--------------|--------------------|
| Antimony, Sb | 100.0 ± 0.7 µg/mL  | Arsenic, As  | 40.00 ± 0.26 µg/mL |
| Cadmium, Cd  | 49.99 ± 0.22 µg/mL | Lead, Pb     | 19.99 ± 0.09 µg/mL |
| Selenium, Se | 50.00 ± 0.23 µg/mL | Thallium, Tl | 50.00 ± 0.22 µg/mL |

Density: 1.025 g/mL (measured at 20 ± 4 °C)

Assay Information:

| ANALYTE | METHOD     | NIST SRM# | SRM LOT#     |
|---------|------------|-----------|--------------|
| As      | ICP Assay  | 3103a     | 100818       |
| Cd      | ICP Assay  | 3108      | 130116       |
| Cd      | EDTA       | 928       | 928          |
| Cd      | Calculated |           | See Sec. 4.2 |
| Pb      | ICP Assay  | 3128      | 101026       |
| Pb      | EDTA       | 928       | 928          |
| Pb      | Calculated |           | See Sec. 4.2 |
| Sb      | ICP Assay  | 3102a     | 140911       |
| Se      | ICP Assay  | 3149      | 100901       |
| Se      | Calculated |           | See Sec. 4.2 |
| Tl      | ICP Assay  | 3158      | 151215       |
| Tl      | Calculated |           | See Sec. 4.2 |

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of  $k = 2$ .

#### Characterization of CRM/RM by Two or More Methods

Certified Value,  $X_{\text{CRM/RM}}$ , where two or more methods of characterization are used is the weighted mean of the results:

$$X_{\text{CRM/RM}} = \sum(w_i)(X_i)$$

$X_i$  = mean of Assay Method  $i$  with standard uncertainty  $u_{\text{char } i}$

$w_i$  = the weighting factors for each method calculated using the inverse square of the variance:

$$w_i = (1/u_{\text{char } i})^2 / (\sum(1/(u_{\text{char } i})^2))$$

$$\text{CRM/RM Expanded Uncertainty (k)} = U_{\text{CRM/RM}} = k(u_{\text{char}}^2 + u_{\text{bb}}^2 + u_{\text{Its}}^2 + u_{\text{ts}}^2)^{1/2}$$

$k$  = coverage factor = 2

$u_{\text{char}} = (\sum((w_i)^2(u_{\text{char } i})^2))^{1/2}$  where  $u_{\text{char } i}$  are the errors from each characterization method

$u_{\text{bb}}$  = bottle to bottle homogeneity standard uncertainty

$u_{\text{Its}}$  = long term stability standard uncertainty (storage)

$u_{\text{ts}}$  = transport stability standard uncertainty

#### Characterization of CRM/RM by One Method

Certified Value,  $X_{\text{CRM/RM}}$ , where one method of characterization is used is the mean of individual results:

$$X_{\text{CRM/RM}} = (X_a)(u_{\text{char } a})$$

$X_a$  = mean of Assay Method A with

$u_{\text{char } a}$  = the standard uncertainty of characterization Method A

$$\text{CRM/RM Expanded Uncertainty (k)} = U_{\text{CRM/RM}} = k(u_{\text{char } a}^2 + u_{\text{bb}}^2 + u_{\text{Its}}^2 + u_{\text{ts}}^2)^{1/2}$$

$k$  = coverage factor = 2

$u_{\text{char } a}$  = the errors from characterization

$u_{\text{bb}}$  = bottle to bottle homogeneity standard uncertainty

$u_{\text{Its}}$  = long term stability standard uncertainty (storage)

$u_{\text{ts}}$  = transport stability standard uncertainty

## 4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

### 4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

### 4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

### 4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

## 5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/A

## 6.0 INTENDED USE

6.1 This standard is intended for the calibration of analytical instruments and validation of analytical methods as appropriate. This CRM may be used in connection with EPA Methods 6010, 6020 (all versions), Standard Methods 3120 B and USP <232> / ICH Q3D.

6.2 For products attaining traceability through Inorganic Ventures' Primary Certified Reference Materials (PCRM™) see the Limited License to Use PCRM™ In the Inorganic Ventures Terms and Conditions of Sale, <https://www.inorganicventures.com/terms-and-conditions-sale>. The Terms and Conditions contain information on the use of materials traceable to PCRM™ certified reference materials. This Limited License agreement is especially pertinent for laboratories accredited under ISO:17034.

## **7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL**

### **7.1 Storage and Handling Recommendations**

- Store between approximately 4° - 30° C while in sealed TCT bag.
- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.
- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit [www.inorganicventures.com/TCT](http://www.inorganicventures.com/TCT)

## **8.0 HAZARDOUS INFORMATION**

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

## **9.0 HOMOGENEITY**

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

## **10.0 QUALITY STANDARD DOCUMENTATION**

### **10.1 ISO 9001 Quality Management System Registration**

- QSR Certificate Number QSR-1034

### **10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"**

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

### **10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"**

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; [inorganicventures.com](http://inorganicventures.com); [info@inorganicventures.com](mailto:info@inorganicventures.com)

## **11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY**

### 11.1 Certification Issue Date

March 12, 2024

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

### 11.2 Lot Expiration Date

- **March 12, 2029**

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

### 11.3 Period of Validity

- Sealed TCT Bag Open Date: \_\_\_\_\_

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

## 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

### Certificate Approved By:

Joseph Burns  
Custom VS Manager



### Certifying Officer:

Paul Gaines  
Chairman / Senior Technical Director





**CERTIFIED WEIGHT REPORT:**

**Part Number:** 57056  
**Lot Number:** 010924  
**Description:** Barium (Ba)  
**Solvent:** Nitric Acid  
**Lot #**

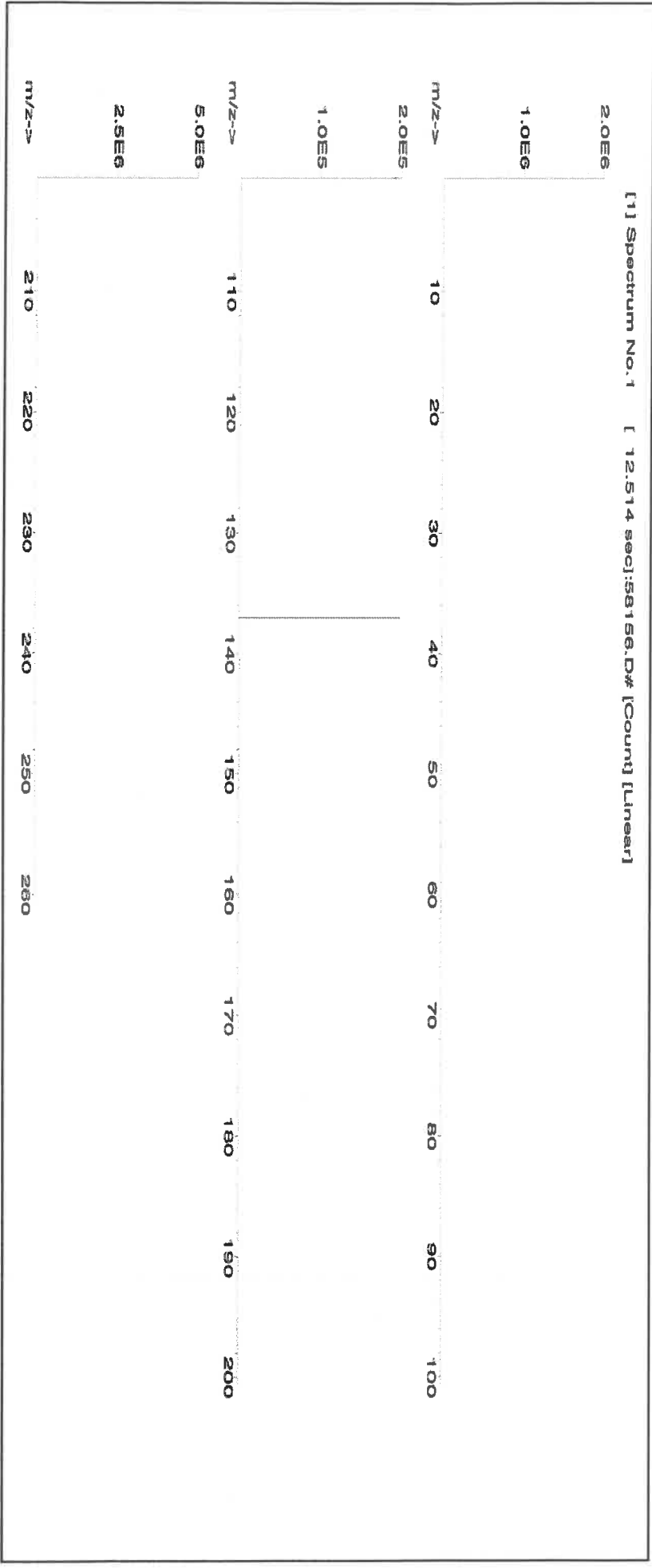
**Expiration Date:** 010927  
**Recommended Storage:** Ambient (20 °C)  
**Nominal Concentration (µg/mL):** 1000  
**2%** **40.0** **Nitric Acid**  
**(mL)**

**NIST Test Number:** 6UTB

**Weight shown below was diluted to (mL):** 2000.02 **5E-05** **Balance Uncertainty**  
**0.058** **Flask Uncertainty**

|                          |                   |
|--------------------------|-------------------|
| <i>Giovanni Esposito</i> |                   |
| Formulated By:           | Giovanni Esposito |
|                          | 010924            |
| <i>Pedro L. Renteria</i> |                   |
| Reviewed By:             | Pedro L. Renteria |
|                          | 010924            |

| SDS Information     |                   |                       |            |                 |           |                   |                   |                      |                                  |
|---------------------|-------------------|-----------------------|------------|-----------------|-----------|-------------------|-------------------|----------------------|----------------------------------|
| Compound            | Lot Number        | Nominal Conc. (µg/mL) | Purity (%) | Uncertainty (%) | Assay (%) | Target Weight (g) | Actual Weight (g) | Actual Conc. (µg/mL) | Expanded Uncertainty +/- (µg/mL) |
| Barium nitrate (Ba) | IN023 BA0022019A1 | 1000                  | 99.999     | 0.10            | 52.3      | 3.82417           | 3.82441           | 1000.1               | 2.0                              |
|                     |                   |                       |            |                 |           |                   |                   | 10022-31-8           | 0.5 mg/m3                        |
|                     |                   |                       |            |                 |           |                   |                   |                      | or-hat 355 mg/kg 3104a           |







**Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):**

**Trace Metals Verification by ICP-MS (µg/mL)**

|    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |
|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|
| Al | <0.02 | Cd | <0.02 | Dy | <0.02 | Hf | <0.02 | Li | <0.02 | Ni | <0.02 | Pr | <0.02 | Se | <0.2  | Tb | <0.02 | W  | <0.02 |
| Sb | <0.02 | Ca | <0.2  | Er | <0.02 | Ho | <0.02 | Lu | <0.02 | Nb | <0.02 | Re | <0.02 | Si | <0.02 | Te | <0.02 | U  | <0.02 |
| As | <0.2  | Ce | <0.02 | Eu | <0.02 | In | <0.02 | Mg | <0.01 | Os | <0.02 | Rh | <0.02 | Ag | <0.02 | Tl | <0.02 | V  | <0.02 |
| Ba | T     | Cs | <0.02 | Gd | <0.02 | Ir | <0.02 | Mn | <0.02 | Pd | <0.02 | Rb | <0.02 | Na | <0.2  | Th | <0.02 | Yb | <0.02 |
| Be | <0.01 | Cr | <0.02 | Ga | <0.02 | Fe | <0.2  | Hg | <0.2  | P  | <0.02 | Ru | <0.02 | Sr | <0.02 | Tm | <0.02 | Y  | <0.02 |
| Bi | <0.02 | Co | <0.02 | Ge | <0.02 | La | <0.02 | Mo | <0.02 | Pt | <0.02 | Sm | <0.02 | S  | <0.02 | Sn | <0.02 | Zn | <0.02 |
| B  | <0.02 | Cu | <0.02 | Au | <0.02 | Pb | <0.02 | Nd | <0.02 | K  | <0.2  | Sc | <0.02 | Ta | <0.02 | Ti | <0.02 | Zr | <0.02 |

(T) = Target analyte

**Physical Characterization:**

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
- \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- \* Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- \* All Standards should be stored with caps tight and under appropriate laboratory conditions.
- \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



**CERTIFIED WEIGHT REPORT:**

**Part Number:**  
**Lot Number:**  
**Description:**

57048  
070124  
Cadmium (Cd)

**Solvent:** 24002546 Nitric Acid

*R: 815/24*

**Lot #**

**2%** 40.0 Nitric Acid (mL)

**Expiration Date:** 070127

**Recommended Storage:** Ambient (20 °C)

**Nominal Concentration (µg/mL):** 1000

**NIST Test Number:** 6UTB

SE-05 Balance Uncertainty

**Weight shown below was diluted to (mL):** 2000.07 0.100 Flask Uncertainty

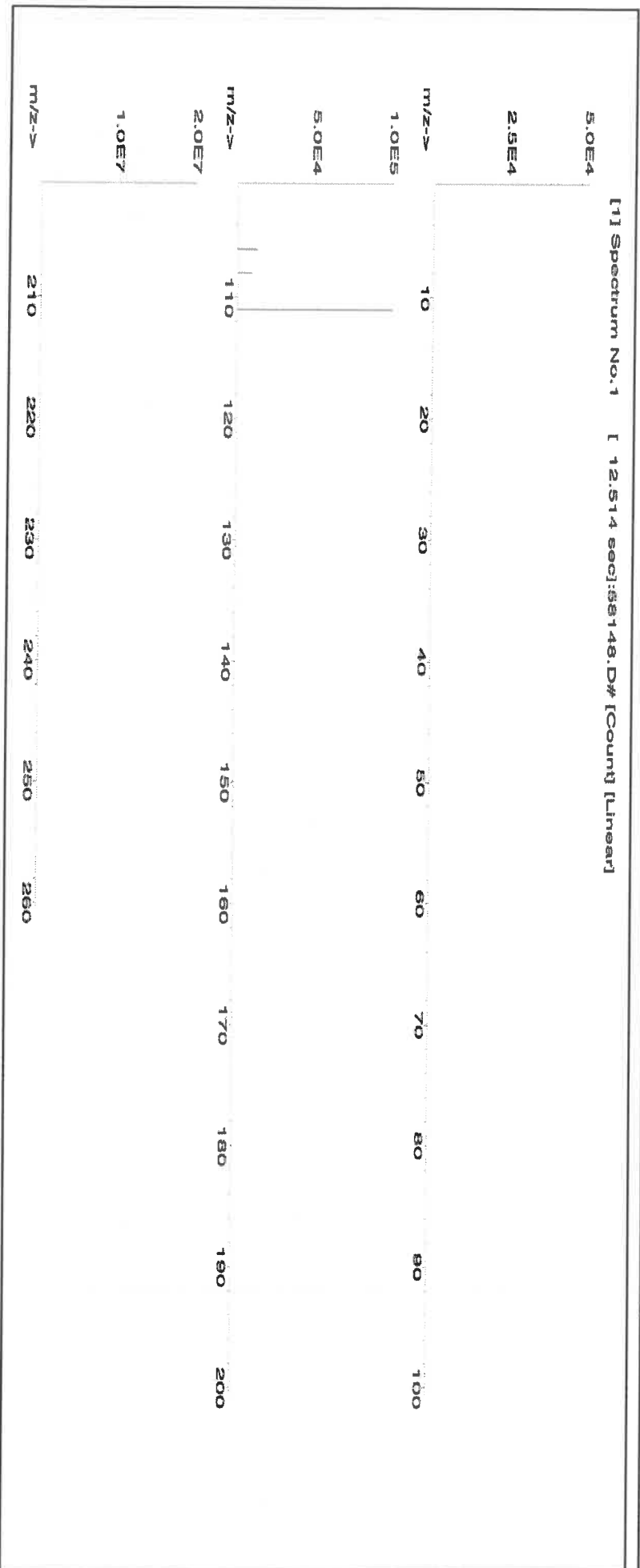
|                        |                 |
|------------------------|-----------------|
| <i>Aleah O'Brady</i>   |                 |
| Formulated By:         | Aleah O'Brady   |
|                        | 070124          |
| <i>Pedro L. Rentas</i> |                 |
| Reviewed By:           | Pedro L. Rentas |
|                        | 070124          |

**Compound**

| Lot Number | Nominal Conc. (µg/mL) | Purity (%) | Uncertainty (%) | Assay (%) | Target Weight (g) | Actual Weight (g) | Actual Conc. (µg/mL) | Expanded Uncertainty +/- (µg/mL) | CAS# | OSHA PEL (TWA) | LD50 | NIST SRM |
|------------|-----------------------|------------|-----------------|-----------|-------------------|-------------------|----------------------|----------------------------------|------|----------------|------|----------|
|------------|-----------------------|------------|-----------------|-----------|-------------------|-------------------|----------------------|----------------------------------|------|----------------|------|----------|

1. Cadmium nitrate tetrahydrate (Cd) IN024 CDM09221A1 1000 99.999 0.10 36.5 5.4797 5.4804 1000.1 2.0 10022-68-1 0.01 mg/m3 or-rat 60.2mg/kg 3108

[1] Spectrum No.1 [12.514 sec]:\$8148.D# [Count] [Linear]





**Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):**

**Trace Metals Verification by ICP-MS (µg/mL)**

|    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |
|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|
| Al | <0.02 | Cd | <0.2  | Dy | <0.02 | Hf | <0.02 | Li | <0.02 | Ni | <0.02 | Pt | <0.02 | Se | <0.2  | Tb | <0.02 | W  | <0.02 |
| Sb | <0.02 | Ca | <0.2  | Er | <0.02 | Ho | <0.02 | Lu | <0.02 | Nb | <0.02 | Re | <0.02 | Si | <0.02 | Te | <0.02 | U  | <0.02 |
| As | <0.2  | Ce | <0.02 | Ba | <0.02 | In | <0.02 | Mg | <0.01 | Os | <0.02 | Rh | <0.02 | Ag | <0.02 | Tl | <0.02 | V  | <0.02 |
| Ba | <0.02 | Cs | <0.02 | Cd | <0.02 | Ir | <0.02 | Mn | <0.02 | Pd | <0.02 | Rb | <0.02 | Na | <0.2  | Th | <0.02 | Yb | <0.02 |
| Be | <0.01 | Cr | <0.02 | Ga | <0.02 | Fe | <0.2  | Hg | <0.2  | P  | <0.02 | Ru | <0.02 | Sr | <0.02 | Tm | <0.02 | Y  | <0.02 |
| Bi | <0.02 | Co | <0.02 | Ge | <0.02 | La | <0.02 | Mo | <0.02 | Pr | <0.02 | Sm | <0.02 | S  | <0.02 | Sn | <0.02 | Zn | <0.02 |
| B  | <0.02 | Cu | <0.02 | Au | <0.02 | Pb | <0.02 | Nd | <0.02 | K  | <0.2  | Sc | <0.02 | Ta | <0.02 | Ti | <0.02 | Zr | <0.02 |

(T) = Target analyte

**Physical Characterization:**

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
- \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- \* Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- \* All standards should be stored with caps tight and under appropriate laboratory conditions.
- \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



Refine your results. Redefine your industry.

# Certificate of Analysis

300 Technology Drive  
Christiansburg, VA 24073 USA  
inorganicventures.com

P: 800-669-6799/540-585-3030  
F: 540-585-3012  
info@inorganicventures.com

## 1.0 ACCREDITATION / REGISTRATION

**INORGANIC VENTURES** is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



## 2.0 PRODUCT DESCRIPTION

|                     |                                     |                       |
|---------------------|-------------------------------------|-----------------------|
| Product Code:       | Multi Analyte Custom Grade Solution |                       |
| Catalog Number:     | CLPP-CAL-1                          |                       |
| Lot Number:         | T2-MEB714417                        |                       |
| Matrix:             | 5% (v/v) HNO <sub>3</sub>           |                       |
| Value / Analyte(s): | 5 000 µg/mL ea:                     | Potassium,<br>Sodium, |
|                     | Calcium,<br>Magnesium,              |                       |
|                     | 2 000 µg/mL ea:                     | Barium,               |
|                     | Aluminum,                           |                       |
|                     | 1 000 µg/mL ea:                     |                       |
|                     | Iron,                               |                       |
|                     | 500 µg/mL ea:                       | Vanadium,<br>Cobalt,  |
|                     | Nickel,                             |                       |
|                     | Zinc,                               |                       |
|                     | Manganese,                          |                       |
|                     | 250 µg/mL ea:                       | Copper,               |
|                     | Silver,                             |                       |
|                     | 200 µg/mL ea:                       |                       |
|                     | Chromium,                           |                       |
|                     | 50 µg/mL ea:                        |                       |
|                     | Beryllium                           |                       |

## 3.0 CERTIFIED VALUES AND UNCERTAINTIES

|                |                        |                |                        |
|----------------|------------------------|----------------|------------------------|
| <b>ANALYTE</b> | <b>CERTIFIED VALUE</b> | <b>ANALYTE</b> | <b>CERTIFIED VALUE</b> |
| Aluminum, Al   | 2 000 ± 7 µg/mL        | Barium, Ba     | 2 000 ± 9 µg/mL        |
| Beryllium, Be  | 50.00 ± 0.26 µg/mL     | Calcium, Ca    | 5 000 ± 22 µg/mL       |
| Chromium, Cr   | 200.0 ± 1.0 µg/mL      | Cobalt, Co     | 500.0 ± 2.4 µg/mL      |
| Copper, Cu     | 250.0 ± 1.0 µg/mL      | Iron, Fe       | 1 000 ± 4 µg/mL        |
| Magnesium, Mg  | 5 000 ± 20 µg/mL       | Manganese, Mn  | 500.0 ± 2.0 µg/mL      |
| Nickel, Ni     | 500.0 ± 2.2 µg/mL      | Potassium, K   | 5 000 ± 19 µg/mL       |
| Silver, Ag     | 250.0 ± 1.1 µg/mL      | Sodium, Na     | 5 000 ± 18 µg/mL       |
| Vanadium, V    | 499.7 ± 2.2 µg/mL      | Zinc, Zn       | 500.0 ± 2.2 µg/mL      |

**Density:** 1.118 g/mL (measured at 20 ± 4 °C)

**Assay Information:**

| ANALYTE | METHOD      | NIST SRM# | SRM LOT#     |
|---------|-------------|-----------|--------------|
| Ag      | ICP Assay   | 3151      | 160729       |
| Ag      | Volhard     | 999c      | 999c         |
| Al      | ICP Assay   | 3101a     | 140903       |
| Al      | EDTA        | 928       | 928          |
| Ba      | ICP Assay   | 3104a     | 140909       |
| Ba      | Gravimetric |           | See Sec. 4.2 |
| Be      | ICP Assay   | 3105a     | 090514       |
| Be      | Calculated  |           | See Sec. 4.2 |
| Ca      | ICP Assay   | 3109a     | 130213       |
| Ca      | EDTA        | 928       | 928          |
| Co      | ICP Assay   | 3113      | 190630       |
| Co      | EDTA        | 928       | 928          |
| Cr      | ICP Assay   | 3112a     | 170630       |
| Cr      | Calculated  |           | See Sec. 4.2 |
| Cu      | ICP Assay   | 3114      | 121207       |
| Cu      | EDTA        | 928       | 928          |
| Fe      | ICP Assay   | 3126a     | 140812       |
| Fe      | EDTA        | 928       | 928          |
| K       | ICP Assay   | 3141a     | 140813       |
| K       | Gravimetric |           | See Sec. 4.2 |
| Mg      | ICP Assay   | 3131a     | 140110       |
| Mg      | EDTA        | 928       | 928          |
| Mn      | ICP Assay   | 3132      | 050429       |
| Mn      | EDTA        | 928       | 928          |
| Na      | ICP Assay   | 3152a     | 120715       |
| Na      | Gravimetric |           | See Sec. 4.2 |
| Ni      | ICP Assay   | 3136      | 120619       |
| Ni      | EDTA        | 928       | 928          |
| V       | IC Assay    | 3165      | 160906       |
| V       | EDTA        | 928       | 928          |
| Zn      | ICP Assay   | 3168a     | 120629       |
| Zn      | EDTA        | 928       | 928          |

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

#### Characterization of CRM/RM by Two or More Methods

Certified Value,  $X_{\text{CRM/RM}}$ , where two or more methods of characterization are used is the weighted mean of the results:

$$X_{\text{CRM/RM}} = \sum(w_i)(X_i)$$

$X_i$  = mean of Assay Method  $i$  with standard uncertainty  $u_{\text{char } i}$

$w_i$  = the weighting factors for each method calculated using the inverse square of the variance:

$$w_i = (1/u_{\text{char } i}^2) / (\sum(1/u_{\text{char } i}^2))$$

$$\text{CRM/RM Expanded Uncertainty } (\pm) = U_{\text{CRM/RM}} = k(u_{\text{char}}^2 + u_{\text{bb}}^2 + u_{\text{Its}}^2 + u_{\text{ts}}^2)^{1/2}$$

$k$  = coverage factor = 2

$u_{\text{char}} = [\sum(w_i)^2(u_{\text{char } i}^2)]^{1/2}$  where  $u_{\text{char } i}$  are the errors from each characterization method

$u_{\text{bb}}$  = bottle to bottle homogeneity standard uncertainty

$u_{\text{Its}}$  = long term stability standard uncertainty (storage)

$u_{\text{ts}}$  = transport stability standard uncertainty

#### Characterization of CRM/RM by One Method

Certified Value,  $X_{\text{CRM/RM}}$ , where one method of characterization is used is the mean of individual results:

$$X_{\text{CRM/RM}} = (X_a)(u_{\text{char } a})$$

$X_a$  = mean of Assay Method A with

$u_{\text{char } a}$  = the standard uncertainty of characterization Method A

$$\text{CRM/RM Expanded Uncertainty } (\pm) = U_{\text{CRM/RM}} = k(u_{\text{char } a}^2 + u_{\text{bb}}^2 + u_{\text{Its}}^2 + u_{\text{ts}}^2)^{1/2}$$

$k$  = coverage factor = 2

$u_{\text{char } a}$  = the errors from characterization

$u_{\text{bb}}$  = bottle to bottle homogeneity standard uncertainty

$u_{\text{Its}}$  = long term stability standard uncertainty (storage)

$u_{\text{ts}}$  = transport stability standard uncertainty

## 4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

### 4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

### 4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

### 4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

## 5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/A

## 6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

## 7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

### 7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit [www.inorganicventures.com/TCT](http://www.inorganicventures.com/TCT)

**Note:** This solution contains Silver (Ag), please refer to our Sample Preparation Guide for more information.

<https://www.inorganicventures.com/sample-preparation-guide/samples-containing-silver>

## 8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

## 9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

## 10.0 QUALITY STANDARD DOCUMENTATION

### 10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

### 10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

### 10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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## 11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

### 11.1 Certification Issue Date

January 27, 2022

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

### 11.2 Lot Expiration Date

- **January 27, 2027**

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

### 11.3 Period of Validity

- Sealed TCT Bag Open Date: \_\_\_\_\_

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

## 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

### Certificate Approved By:

Thomas Kozikowski  
Manager, Quality Control



### Certifying Officer:

Paul Gaines  
Chairman / Senior Technical Director





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# Certificate of Analysis

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## 1.0 ACCREDITATION / REGISTRATION

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## 2.0 PRODUCT DESCRIPTION

Product Code: Multi Analyte Custom Grade Solution  
Catalog Number: CLPP-CAL-3  
Lot Number: T2-MEB714159  
Matrix: 7% (v/v) HNO<sub>3</sub>  
Value / Analyte(s):  
1 000 µg/mL ea:  
Arsenic, Lead,  
Selenium, Thallium,  
500 µg/mL ea:  
Cadmium

## 3.0 CERTIFIED VALUES AND UNCERTAINTIES

| ANALYTE      | CERTIFIED VALUE | ANALYTE      | CERTIFIED VALUE   |
|--------------|-----------------|--------------|-------------------|
| Arsenic, As  | 1 000 ± 8 µg/mL | Cadmium, Cd  | 500.0 ± 2.1 µg/mL |
| Lead, Pb     | 1 000 ± 5 µg/mL | Selenium, Se | 1 000 ± 8 µg/mL   |
| Thallium, Tl | 1 000 ± 7 µg/mL |              |                   |

Density: 1.043 g/mL (measured at 20 ± 4 °C)

### Assay Information:

| ANALYTE | METHOD    | NIST SRM# | SRM LOT# |
|---------|-----------|-----------|----------|
| As      | ICP Assay | 3103a     | 100818   |
| Cd      | ICP Assay | 3108      | 130116   |
| Cd      | EDTA      | 928       | 928      |
| Pb      | ICP Assay | 3128      | 101026   |
| Pb      | EDTA      | 928       | 928      |
| Se      | ICP Assay | 3149      | 100901   |
| Tl      | ICP Assay | 3158      | 151215   |

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.



#### Characterization of CRM/RM by Two or More Methods

Certified Value,  $X_{\text{CRM/RM}}$ , where two or more methods of characterization are used is the weighted mean of the results:

$$X_{\text{CRM/RM}} = \sum(w_i)(X_i)$$

$X_i$  = mean of Assay Method  $i$  with standard uncertainty  $u_{\text{char } i}$

$w_i$  = the weighting factors for each method calculated using the inverse square of the variance:

$$w_i = (1/u_{\text{char } i}^2) / (\sum(1/u_{\text{char } i}^2))$$

$$\text{CRM/RM Expanded Uncertainty } (\pm) = U_{\text{CRM/RM}} = k (u_{\text{char}}^2 + u_{\text{bb}}^2 + u_{\text{Its}}^2 + u_{\text{ts}}^2)^{1/2}$$

$k$  = coverage factor = 2

$u_{\text{char}} = [\sum(w_i)^2 (u_{\text{char } i}^2)]^{1/2}$  where  $u_{\text{char } i}$  are the errors from each characterization method

$u_{\text{bb}}$  = bottle to bottle homogeneity standard uncertainty

$u_{\text{Its}}$  = long term stability standard uncertainty (storage)

$u_{\text{ts}}$  = transport stability standard uncertainty

#### Characterization of CRM/RM by One Method

Certified Value,  $X_{\text{CRM/RM}}$ , where one method of characterization is used is the mean of individual results:

$$X_{\text{CRM/RM}} = (X_a)(u_{\text{char } a})$$

$X_a$  = mean of Assay Method A with

$u_{\text{char } a}$  = the standard uncertainty of characterization Method A

$$\text{CRM/RM Expanded Uncertainty } (\pm) = U_{\text{CRM/RM}} = k (u_{\text{char } a}^2 + u_{\text{bb}}^2 + u_{\text{Its}}^2 + u_{\text{ts}}^2)^{1/2}$$

$k$  = coverage factor = 2

$u_{\text{char } a}$  = the errors from characterization

$u_{\text{bb}}$  = bottle to bottle homogeneity standard uncertainty

$u_{\text{Its}}$  = long term stability standard uncertainty (storage)

$u_{\text{ts}}$  = transport stability standard uncertainty

## 4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

### 4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

### 4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

### 4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

## 5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/A

## 6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

## 7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

### 7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit [www.inorganicventures.com/TCT](http://www.inorganicventures.com/TCT)

## 8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

## 9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

## 10.0 QUALITY STANDARD DOCUMENTATION

### 10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

### 10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

### 10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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## 11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

### 11.1 Certification Issue Date

January 13, 2022

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

### 11.2 Lot Expiration Date

- **January 13, 2027**

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

### 11.3 Period of Validity

- Sealed TCT Bag Open Date: \_\_\_\_\_

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

## 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

### Certificate Approved By:

Thomas Kozikowski  
Manager, Quality Control



### Certifying Officer:

Paul Gaines  
Chairman / Senior Technical Director





R: 815/24



**CERTIFIED WEIGHT REPORT:**

Part Number: **57182**  
Lot Number: **110923**  
Description: **Lead (Pb)**

Solvent: **24002546 Nitric Acid**

Expiration Date: **110926**  
Recommended Storage: **Ambient (20 °C)**  
Nominal Concentration (µg/mL): **10000**  
NIST Test Number: **6UTB**

2% **40.0** **Nitric Acid**  
(mL)

Weight shown below was diluted to (mL): **2000.02** **5E-05** Balance Uncertainty  
**0.058** Flask Uncertainty

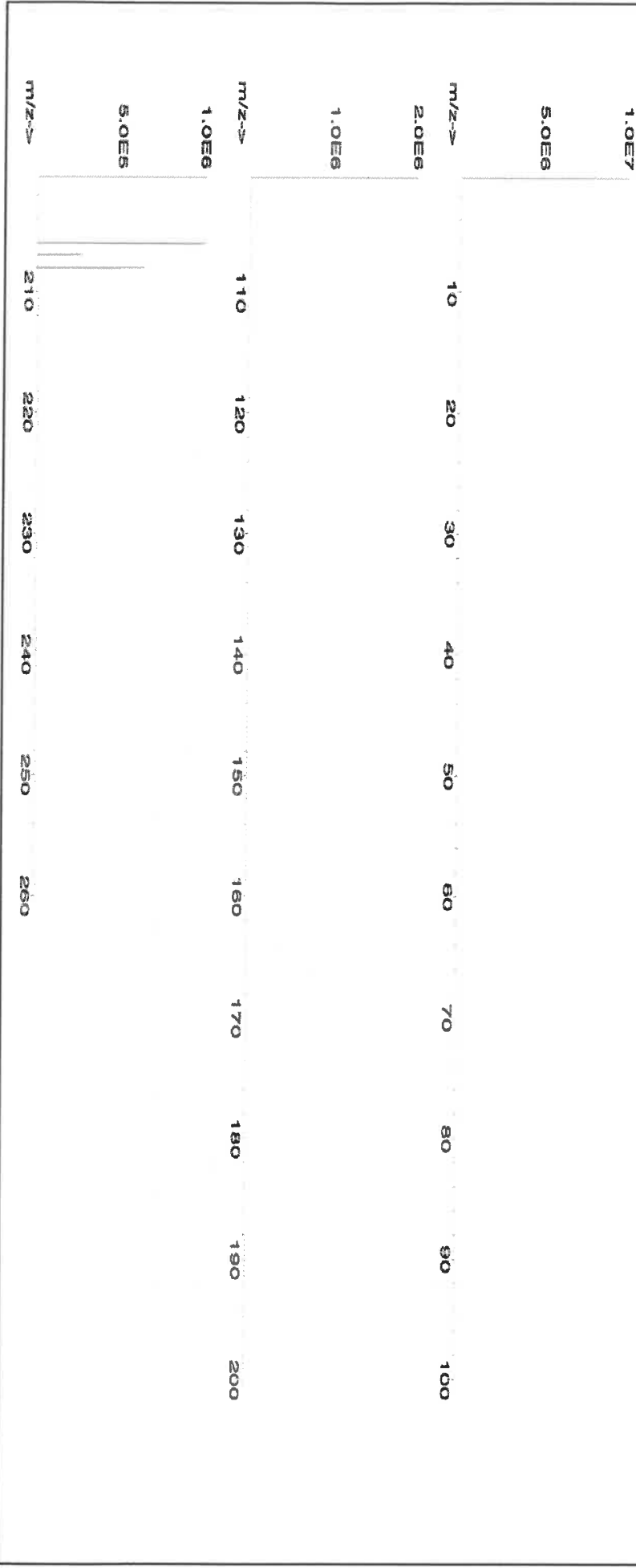
|                |                 |
|----------------|-----------------|
|                |                 |
| Formulated By: | Lawrence Barry  |
|                |                 |
| Reviewed By:   | Pedro L. Rentas |
| 110923         |                 |

| Compound                 | SDS Information |             |                       |            |                        |           |                   |                   |                      |                                  |
|--------------------------|-----------------|-------------|-----------------------|------------|------------------------|-----------|-------------------|-------------------|----------------------|----------------------------------|
|                          | RM#             | Lot Number  | Nominal Conc. (µg/mL) | Purity (%) | Uncertainty Purity (%) | Assay (%) | Target Weight (g) | Actual Weight (g) | Actual Conc. (µg/mL) | Expanded Uncertainty +/- (µg/mL) |
| 1. Lead(II) nitrate (Pb) | IN029           | PED122016A1 | 10000                 | 99.999     | 0.10                   | 62.5      | 32.0006           | 32.0040           | 10001.1              | 20.0                             |

(Solvent Safety Info. On Attached pg.)  
CAS# **OSHA PEL (TWA)** **LD50** **NIST SRM**

intrinsic rat 83 mg/kg **3128**

[1] Spectrum No.1 [ 17.284 sec]:58182.D# [Count] [Linear]





**Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):**

**Trace Metals Verification by ICP-MS ( $\mu\text{g/mL}$ )**

|    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |
|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|
| Al | <0.02 | Cd | <0.02 | Dy | <0.02 | Hf | <0.02 | Li | <0.02 | Ni | <0.02 | Pt | <0.02 | Se | <0.2  | Tb | <0.02 | W  | <0.02 |
| Sb | <0.02 | Ca | <0.2  | Er | <0.02 | Ho | <0.02 | Lu | <0.02 | Nb | <0.02 | Re | <0.02 | Si | <0.02 | Te | <0.02 | U  | <0.02 |
| As | <0.2  | Ce | <0.02 | Eu | <0.02 | In | <0.02 | Mg | <0.01 | Os | <0.02 | Rh | <0.02 | Ag | <0.02 | Tl | <0.02 | V  | <0.02 |
| Ba | <0.02 | Cs | <0.02 | Gd | <0.02 | Ir | <0.02 | Mn | <0.02 | Pd | <0.02 | Rb | <0.02 | Na | <0.2  | Th | <0.02 | Yb | <0.02 |
| Be | <0.01 | Cr | <0.02 | Ga | <0.02 | Fe | <0.2  | Hg | <0.2  | P  | <0.02 | Ru | <0.02 | Sr | <0.02 | Tm | <0.02 | Y  | <0.02 |
| Bi | <0.02 | Co | <0.02 | Ge | <0.02 | La | <0.02 | Mo | <0.02 | Pt | <0.02 | Sm | <0.02 | S  | <0.02 | Sn | <0.02 | Zn | <0.02 |
| B  | <0.02 | Cu | <0.02 | Au | <0.02 | Pb | T     | Nd | <0.02 | K  | <0.2  | Sc | <0.02 | Ta | <0.02 | Ti | <0.02 | Zr | <0.02 |

**Physical Characterization:**

(T)= Target analyte

Certified by:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
- \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- \* Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- \* All Standards should be stored with caps tight and under appropriate laboratory conditions.
- \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY  
"An ISO 9001:2015 Certified Program"

Instructions for QATS Reference Material: ICP-AES ICS

**QATS LABORATORY INORGANIC REFERENCE MATERIAL  
INTERFERENCE CHECK SAMPLE SET FOR ICP-AES (ICSA WITH ICSB)**

**NOTE:** These instructions are for advisory purposes only. If any apparent conflict exists between these instructions and the analytical protocol or your contract, disregard these instructions.

**APPLICATION:** For use with the CLP SFAM01.0 SOW and revisions.

**CAUTION:** Read instructions carefully before opening bottle(s) and proceeding with the analyses.

Contains Heavy Metals  
**HAZARDOUS MATERIAL**

Safety Data Sheets  
Available Upon Request

**(A) SAMPLE DESCRIPTION**

Enclosed is a set of one (1) or more bottles of Aqueous Reference Material, each composed of metals at various concentrations and prepared with nitrate salts and oxy-acids of the respective elements in a 5% nitric acid matrix. **For the reference material source in reporting ICSA and ICSAB mixture use "USEPA". For the reference material lot number for the ICSA use "ICSA-1211" and for the ICSAB mixture use "ICSA-1211+ICSB-0710".**

**CAUTION:** The bottle(s) should be protected from light during storage to ensure the stability of silver which is contained in the ICSB solution. The bottle(s) should be stored at room temperature. **Do not allow the solution(s) to freeze.**

**(B) BREAKAGE OR MISSING ITEMS**

Check the contents of the shipment carefully for any broken, leaking, or missing items. Check that the seal is intact on each bottle. Refer to the enclosed chain of custody record. Report any problems to Mr. Keith Strout, APTIM Federal Services, LLC, at (702) 895-8722. If requested, return the chain-of-custody record with appropriate annotations and signatures to the address provided below.

QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY  
APTIM Federal Services, LLC  
2700 Chandler Avenue - Building C  
Las Vegas, NV 89120

**(C) ANALYSIS OF SAMPLES**

The interference check sample set is to be used to verify inter-element and background correction factors of inductively-coupled plasma (ICP) spectrometers. This reference material set consists of two (2) concentrated solutions. The ICSA solution contains the four (4) interferent elements: Al, Ca, Fe, and Mg. The ICSB solution contains the analytes: Ag, As, Sb, Ba, Be,





Instructions for QATS Reference Material: ICP-AES ICS

Cd, Co, Cr, Cu, Mn, Ni, Pb, Tl, Se, V, and Zn. This instruction sheet provides the nominal values for ICP-AES Part A and Part B target analytes when diluted as directed.

Using Class "A" glassware, preparation and analysis must be performed according to the following instructions:

**ICSA-1211, Interferents:** Pipet 10 mL of the ICSA solution into a 100 mL volumetric flask and dilute to volume with 2% v/v HNO<sub>3</sub>. Analyze this ICSA solution by ICP-AES.

**ICSB-0710, Analytes, mixed with ICSA-1211, Interferents:** Pipet 10 mL of the ICSA solution and 10 mL of the ICSB solution into a 100 mL volumetric flask and dilute to volume with 2% v/v HNO<sub>3</sub>. Analyze this ICSAB solution by ICP-AES.

(D) "CERTIFIED VALUE" CONCENTRATIONS OF QATS ICP-AES ICS SOLUTION(S)

The "Certified Value" concentrations of the elements, listed in Table 1 below, were derived from statistically pooled analysis results from the following sources, if available: QATS Laboratory, CLP laboratories, Quarterly Blind (QB)/Proficiency Testing (PT) events, CLP pre-award events, and external referee laboratories.

Table 1. "CERTIFIED VALUES" FOR INTERFERENCE CHECK SAMPLE ICP-AES ICSA-1211, AND ICSA-1211 MIXED WITH ICSB-0710

| Element | CRQL | Part A (µg/L) | Low Limit (µg/L) | High Limit (µg/L) | Part A +Part B (µg/L) | Low Limit (µg/L) | High Limit (µg/L) |
|---------|------|---------------|------------------|-------------------|-----------------------|------------------|-------------------|
| Al      | 200  | 255000        | 216000           | 294000            | 247000                | 209000           | 285000            |
| Sb      | 60   | (0.0)         | -60.0            | 60.0              | 618                   | 525              | 711               |
| As      | 10   | (0.0)         | -10.0            | 10.0              | 104                   | 88.4             | 120               |
| Ba      | 200  | (6.0)         | -194             | 206               | (537)                 | 337              | 737               |
| Be      | 5.0  | (0.0)         | -5.0             | 5.0               | 495                   | 420              | 570               |
| Cd      | 5.0  | (1.0)         | -4.0             | 6.0               | 972                   | 826              | 1120              |
| Ca      | 5000 | 245000        | 208000           | 282000            | 235000                | 199000           | 271000            |
| Cr      | 10   | (52.0)        | 42.0             | 62.0              | 542                   | 460              | 624               |
| Co      | 50   | (0.0)         | -50.0            | 50.0              | 476                   | 404              | 548               |
| Cu      | 25   | (2.0)         | -23.0            | 27.0              | 511                   | 434              | 588               |
| Fe      | 100  | 101000        | 85600            | 116500            | 99300                 | 84400            | 114500            |
| Pb      | 10   | (0.0)         | -10.0            | 10.0              | (49.0)                | 39.0             | 59.0              |
| Mg      | 5000 | 255000        | 216000           | 294000            | 248000                | 210000           | 286000            |
| Mn      | 15   | (7.0)         | -8.0             | 22.0              | 507                   | 430              | 584               |
| Ni      | 40   | (2.0)         | -38.0            | 42.0              | 954                   | 810              | 1100              |
| Se      | 35   | (0.0)         | -35.0            | 35.0              | (46.0)                | 11.0             | 81.0              |
| Ag      | 10   | (0.0)         | -10.0            | 10.0              | 201                   | 170              | 232               |
| Tl      | 25   | (0.0)         | -25.0            | 25.0              | (108)                 | 83.0             | 133               |
| V       | 50   | (0.0)         | -50.0            | 50.0              | 491                   | 417              | 565               |
| Zn      | 60   | (0.0)         | -60.0            | 60.0              | 952                   | 809              | 1095              |

ICSA  
M5126  
M5127  
M5128  
M5129  
M5130

ICSB  
M5219  
M5220  
M5221  
M5222  
M5223

The acceptance ranges for all analytes in parentheses in the above table were determined using the listed certified value  $\pm 1$  times the associated CLP SOW CRQL. The acceptance ranges for all other analytes were determined using the certified value  $\pm 15$  percent of the listed certified value.

# Certificate of Analysis

300 Technology Drive  
 Christiansburg, VA 24073 USA  
 inorganicventures.com

P: 800-669-6799/540-585-3030  
 F: 540-585-3012  
 info@inorganicventures.com

## 1.0 ACCREDITATION / REGISTRATION

**INORGANIC VENTURES** is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



## 2.0 PRODUCT DESCRIPTION

Product Code: Multi Analyte Custom Grade Solution  
 Catalog Number: CHEM-QC-4  
 Lot Number: S2-MEB711674  
 Matrix: 3% (v/v) HNO<sub>3</sub>  
 3% (v/v) HF  
 Value / Analyte(s): 1 000 µg/mL ea:  
 Boron, Molybdenum,  
 Silicon, Tin,  
 Titanium

**Second Source:** Whenever possible, this solution was manufactured from a second set of concentrates in our manufacturing facility.

## 3.0 CERTIFIED VALUES AND UNCERTAINTIES

| ANALYTE      | CERTIFIED VALUE | ANALYTE        | CERTIFIED VALUE |
|--------------|-----------------|----------------|-----------------|
| Boron, B     | 1 000 ± 7 µg/mL | Molybdenum, Mo | 1 000 ± 5 µg/mL |
| Silicon, Si  | 1 000 ± 7 µg/mL | Tin, Sn        | 1 000 ± 5 µg/mL |
| Titanium, Ti | 1 001 ± 6 µg/mL |                |                 |

**Density:** 1.032 g/mL (measured at 20 ± 4 °C)

### Assay Information:

| ANALYTE | METHOD    | NIST SRM# | SRM LOT# |
|---------|-----------|-----------|----------|
| B       | ICP Assay | 3107      | 110830   |
| Mo      | ICP Assay | 3134      | 130418   |
| Si      | ICP Assay | 3150      | 130912   |
| Sn      | ICP Assay | 3161a     | 140917   |
| Ti      | ICP Assay | 3162a     | 130925   |

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

#### Characterization of CRM/RM by Two or More Methods

Certified Value,  $X_{\text{CRM/RM}}$ , where two or more methods of characterization are used is the weighted mean of the results:

$$X_{\text{CRM/RM}} = \sum(w_i)(X_i)$$

$X_i$  = mean of Assay Method  $i$  with standard uncertainty  $u_{\text{char } i}$

$w_i$  = the weighting factors for each method calculated using the inverse square of the variance:

$$w_i = (1/u_{\text{char } i}^2) / (\sum(1/u_{\text{char } i}^2))$$

$$\text{CRM/RM Expanded Uncertainty } (\pm) = U_{\text{CRM/RM}} = k(u_{\text{char}}^2 + u_{\text{bb}}^2 + u_{\text{Its}}^2 + u_{\text{ts}}^2)^{1/2}$$

$k$  = coverage factor = 2

$u_{\text{char}} = [\sum(w_i)^2(u_{\text{char } i}^2)]^{1/2}$  where  $u_{\text{char } i}$  are the errors from each characterization method

$u_{\text{bb}}$  = bottle to bottle homogeneity standard uncertainty

$u_{\text{Its}}$  = long term stability standard uncertainty (storage)

$u_{\text{ts}}$  = transport stability standard uncertainty

#### Characterization of CRM/RM by One Method

Certified Value,  $X_{\text{CRM/RM}}$ , where one method of characterization is used is the mean of individual results:

$$X_{\text{CRM/RM}} = (X_a)(u_{\text{char } a})$$

$X_a$  = mean of Assay Method A with

$u_{\text{char } a}$  = the standard uncertainty of characterization Method A

$$\text{CRM/RM Expanded Uncertainty } (\pm) = U_{\text{CRM/RM}} = k(u_{\text{char } a}^2 + u_{\text{bb}}^2 + u_{\text{Its}}^2 + u_{\text{ts}}^2)^{1/2}$$

$k$  = coverage factor = 2

$u_{\text{char } a}$  = the errors from characterization

$u_{\text{bb}}$  = bottle to bottle homogeneity standard uncertainty

$u_{\text{Its}}$  = long term stability standard uncertainty (storage)

$u_{\text{ts}}$  = transport stability standard uncertainty

## 4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

### 4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

### 4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

### 4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

## 5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/A

## 6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

## 7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

### 7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit [www.inorganicventures.com/TCT](http://www.inorganicventures.com/TCT)

**HF Note:** This standard should not be prepared or stored in glass.

## 8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.



## 9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

## 10.0 QUALITY STANDARD DOCUMENTATION

### 10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

### 10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

### 10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

## 11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

### 11.1 Certification Issue Date

November 02, 2021

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

### 11.2 Lot Expiration Date

- **November 02, 2026**

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

### 11.3 Period of Validity

- Sealed TCT Bag Open Date: \_\_\_\_\_

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

## 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

### Certificate Approved By:

Michael Booth  
Director, Quality Control



### Certifying Officer:

Paul Gaines  
Chairman / Senior Technical Director





Instructions for QATS Reference Material: ICP-AES ICS

**QATS LABORATORY INORGANIC REFERENCE MATERIAL  
INTERFERENCE CHECK SAMPLE SET FOR ICP-AES (ICSA WITH ICSB)**

**NOTE:** These instructions are for advisory purposes only. If any apparent conflict exists between these instructions and the analytical protocol or your contract, disregard these instructions.

**APPLICATION:** For use with the CLP SFAM01.0 SOW and revisions.

**CAUTION:** Read instructions carefully before opening bottle(s) and proceeding with the analyses.

Contains Heavy Metals  
**HAZARDOUS MATERIAL**

Safety Data Sheets  
Available Upon Request

**(A) SAMPLE DESCRIPTION**

Enclosed is a set of one (1) or more bottles of Aqueous Reference Material, each composed of metals at various concentrations and prepared with nitrate salts and oxy-acids of the respective elements in a 5% nitric acid matrix. **For the reference material source in reporting ICSA and ICSAB mixture use "USEPA". For the reference material lot number for the ICSA use "ICSA-1211" and for the ICSAB mixture use "ICSA-1211+ICSB-0710".**

**CAUTION:** The bottle(s) should be protected from light during storage to ensure the stability of silver which is contained in the ICSB solution. The bottle(s) should be stored at room temperature. **Do not allow the solution(s) to freeze.**

**(B) BREAKAGE OR MISSING ITEMS**

Check the contents of the shipment carefully for any broken, leaking, or missing items. Check that the seal is intact on each bottle. Refer to the enclosed chain of custody record. Report any problems to Mr. Keith Strout, APTIM Federal Services, LLC, at (702) 895-8722. If requested, return the chain-of-custody record with appropriate annotations and signatures to the address provided below.

**QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY  
APTIM Federal Services, LLC  
2700 Chandler Avenue - Building C  
Las Vegas, NV 89120**

**(C) ANALYSIS OF SAMPLES**

The interference check sample set is to be used to verify inter-element and background correction factors of inductively-coupled plasma (ICP) spectrometers. This reference material set consists of two (2) concentrated solutions. The ICSA solution contains the four (4) interferent elements: Al, Ca, Fe, and Mg. The ICSB solution contains the analytes: Ag, As, Sb, Ba, Be,





Instructions for QATS Reference Material: ICP-AES ICS

Cd, Co, Cr, Cu, Mn, Ni, Pb, Tl, Se, V, and Zn. This instruction sheet provides the nominal values for ICP-AES Part A and Part B target analytes when diluted as directed.

Using Class "A" glassware, preparation and analysis must be performed according to the following instructions:

**ICSA-1211, Interferents:** Pipet 10 mL of the ICSA solution into a 100 mL volumetric flask and dilute to volume with 2% v/v HNO<sub>3</sub>. Analyze this ICSA solution by ICP-AES.

**ICSB-0710, Analytes, mixed with ICSA-1211, Interferents:** Pipet 10 mL of the ICSA solution and 10 mL of the ICSB solution into a 100 mL volumetric flask and dilute to volume with 2% v/v HNO<sub>3</sub>. Analyze this ICSAB solution by ICP-AES.

(D) "CERTIFIED VALUE" CONCENTRATIONS OF QATS ICP-AES ICS SOLUTION(S)

The "Certified Value" concentrations of the elements, listed in Table 1 below, were derived from statistically pooled analysis results from the following sources, if available: QATS Laboratory, CLP laboratories, Quarterly Blind (QB)/Proficiency Testing (PT) events, CLP pre-award events, and external referee laboratories.

Table 1. "CERTIFIED VALUES" FOR INTERFERENCE CHECK SAMPLE ICP-AES ICSA-1211, AND ICSA-1211 MIXED WITH ICSB-0710

| Element | CRQL | Part A (µg/L) | Low Limit (µg/L) | High Limit (µg/L) | Part A +Part B (µg/L) | Low Limit (µg/L) | High Limit (µg/L) |
|---------|------|---------------|------------------|-------------------|-----------------------|------------------|-------------------|
| Al      | 200  | 255000        | 216000           | 294000            | 247000                | 209000           | 285000            |
| Sb      | 60   | (0.0)         | -60.0            | 60.0              | 618                   | 525              | 711               |
| As      | 10   | (0.0)         | -10.0            | 10.0              | 104                   | 88.4             | 120               |
| Ba      | 200  | (6.0)         | -194             | 206               | (537)                 | 337              | 737               |
| Be      | 5.0  | (0.0)         | -5.0             | 5.0               | 495                   | 420              | 570               |
| Cd      | 5.0  | (1.0)         | -4.0             | 6.0               | 972                   | 826              | 1120              |
| Ca      | 5000 | 245000        | 208000           | 282000            | 235000                | 199000           | 271000            |
| Cr      | 10   | (52.0)        | 42.0             | 62.0              | 542                   | 460              | 624               |
| Co      | 50   | (0.0)         | -50.0            | 50.0              | 476                   | 404              | 548               |
| Cu      | 25   | (2.0)         | -23.0            | 27.0              | 511                   | 434              | 588               |
| Fe      | 100  | 101000        | 85600            | 116500            | 99300                 | 84400            | 114500            |
| Pb      | 10   | (0.0)         | -10.0            | 10.0              | (49.0)                | 39.0             | 59.0              |
| Mg      | 5000 | 255000        | 216000           | 294000            | 248000                | 210000           | 286000            |
| Mn      | 15   | (7.0)         | -8.0             | 22.0              | 507                   | 430              | 584               |
| Ni      | 40   | (2.0)         | -38.0            | 42.0              | 954                   | 810              | 1100              |
| Se      | 35   | (0.0)         | -35.0            | 35.0              | (46.0)                | 11.0             | 81.0              |
| Ag      | 10   | (0.0)         | -10.0            | 10.0              | 201                   | 170              | 232               |
| Tl      | 25   | (0.0)         | -25.0            | 25.0              | (108)                 | 83.0             | 133               |
| V       | 50   | (0.0)         | -50.0            | 50.0              | 491                   | 417              | 565               |
| Zn      | 60   | (0.0)         | -60.0            | 60.0              | 952                   | 809              | 1095              |

ICSA  
M5126  
M5127  
M5128  
M5129  
M5130

ICSB  
M5219  
M5220  
M5221  
M5222  
M5223

The acceptance ranges for all analytes in parentheses in the above table were determined using the listed certified value  $\pm 1$  times the associated CLP SOW CRQL. The acceptance ranges for all other analytes were determined using the certified value  $\pm 15$  percent of the listed certified value.



M5289 R: 07/12/22  
Certified Reference Material CRM

(34)



ANAB ISO 17034 Accredited  
AR-1539 Certificate Number  
https://AbsoluteStandards.com

**CERTIFIED WEIGHT REPORT:**

**Part Number:** 58113  
**Lot Number:** 070622  
**Description:** Aluminum (Al)

**Solvent:** 20370011 Nitric Acid  
**Lot #**

**Expiration Date:** 070625

**2%** 40.0 Nitric Acid  
(mL)

**Recommended Storage:** Ambient (20 °C)

**Nominal Concentration (µg/mL):** 10000

**NIST Test Number:** 6UTB

**Weight shown below was diluted to (mL):** 2000.02 5E-05 Balance Uncertainty  
0.058 Flask Uncertainty

|                |                  |
|----------------|------------------|
|                |                  |
| Formulated By: | Lawrence Barry   |
|                | 070622           |
|                |                  |
| Reviewed By:   | Pedro L. Rientas |
|                | 070622           |

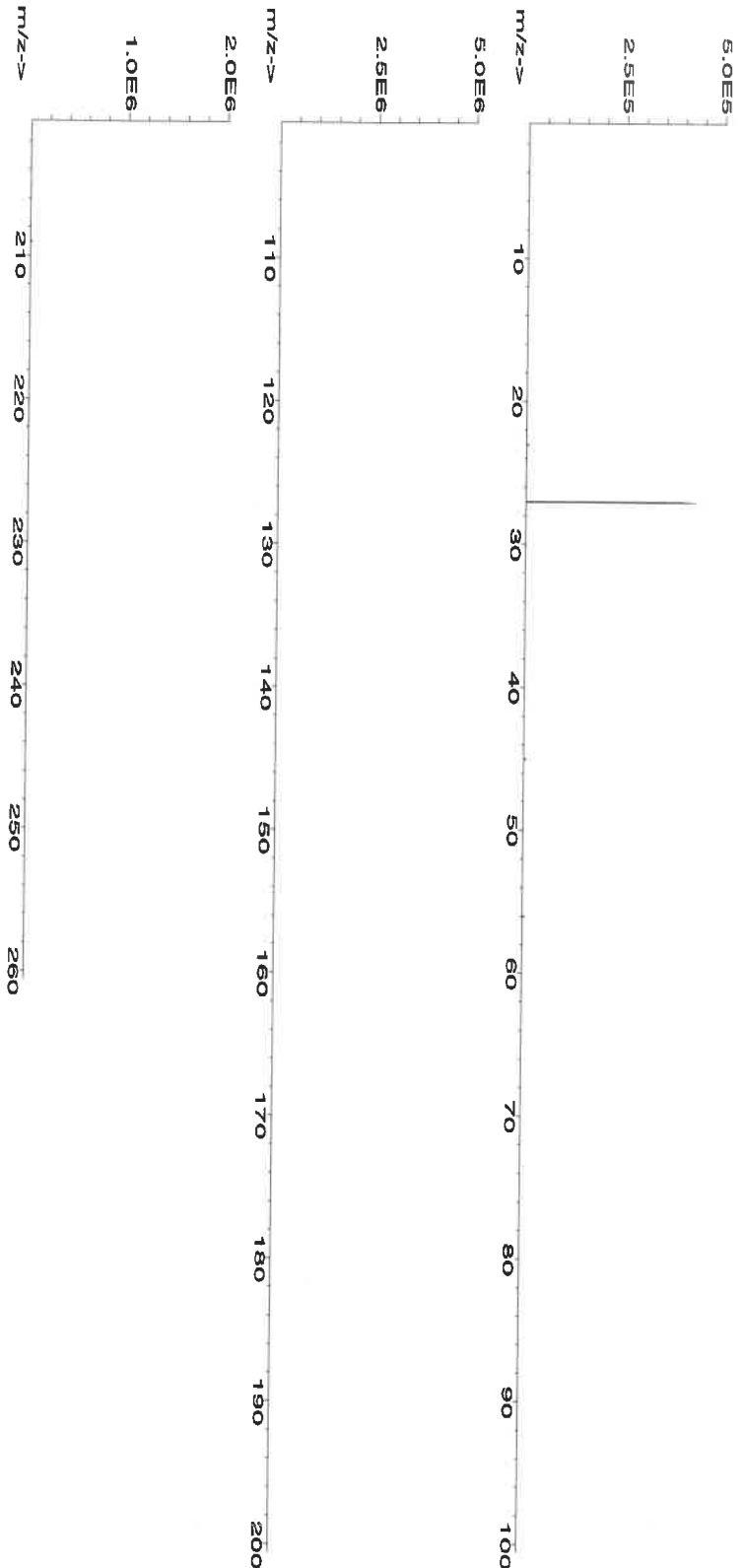
**Compound**

| RM# | Lot Number | Nominal Conc. (µg/mL) | Purity (%) | Uncertainty Purity (%) | Assay (%) | Target Weight (g) | Actual Weight (g) | Actual Conc. (µg/mL) | Expanded Uncertainty +/- (µg/mL) | CAS# | OSHA PEL (TWA) | LD50 | NIST SRM |
|-----|------------|-----------------------|------------|------------------------|-----------|-------------------|-------------------|----------------------|----------------------------------|------|----------------|------|----------|
|-----|------------|-----------------------|------------|------------------------|-----------|-------------------|-------------------|----------------------|----------------------------------|------|----------------|------|----------|

**SDS Information**

1. Aluminum nitrate nonahydrate (Al) IN022 ALD012021A1 10000 99.999 0.10 7.10 281.6956 281.6977 10000.1 20.0 7784-27-2 2 mg/m3 or-tal 3671 mg/kg 3101a

[1] Spectrum No. 1 [15.014 sec]:58113.D# [Count] [Linear]





**Instrumental Analysis by Inductively Coupled Plasma Mass Spectroscopy (ICP-MS):**

**Trace Metals Verification by ICP-MS (µg/mL)**

|    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |
|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|
| Al | T     | Cd | <0.02 | Dy | <0.02 | Hf | <0.02 | Li | <0.02 | Ni | <0.02 | Pt | <0.02 | Se | <0.2  | Tb | <0.02 | W  | <0.02 |
| Sb | <0.02 | Ca | <0.2  | Er | <0.02 | Ho | <0.02 | Lu | <0.02 | Nb | <0.02 | Re | <0.02 | Si | <0.02 | Te | <0.02 | U  | <0.02 |
| As | <0.2  | Ce | <0.02 | Eu | <0.02 | In | <0.02 | Mg | <0.01 | Os | <0.02 | Rh | <0.02 | Ag | <0.02 | Tl | <0.02 | V  | <0.02 |
| Ba | <0.02 | Cs | <0.02 | Gd | <0.02 | Ir | <0.02 | Mn | <0.02 | Pd | <0.02 | Ru | <0.02 | Na | <0.2  | Th | <0.02 | Yb | <0.02 |
| Be | <0.01 | Cr | <0.02 | Ga | <0.02 | Fe | <0.2  | Hg | <0.2  | P  | <0.02 | Sr | <0.02 | S  | <0.02 | Tm | <0.02 | Y  | <0.02 |
| Bi | <0.02 | Co | <0.02 | Ge | <0.02 | La | <0.02 | Mo | <0.02 | Pt | <0.02 | Sm | <0.02 | Ta | <0.02 | Sn | <0.02 | Zn | <0.02 |
| B  | <0.02 | Cu | <0.02 | Au | <0.02 | Pb | <0.02 | Nd | <0.02 | K  | <0.2  | Sc | <0.02 | Ti | <0.02 | Ti | <0.02 | Zr | <0.02 |

(T) = Target analyte

**Physical Characterization:**

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
- \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- \* Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- \* All Standards should be stored with caps tight and under appropriate laboratory conditions.
- \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



R: 4/20/21

Instructions for QATS Reference Material: *Inorganic ICV Solutions*

QATS LABORATORY INORGANIC REFERENCE MATERIAL  
INITIAL CALIBRATION VERIFICATION SOLUTIONS  
(ICV1, ICV5, AND ICV6)

**NOTE:** These instructions are for advisory purposes only. If any apparent conflict exists between these instructions and the analytical protocol or your contract, disregard these instructions.

**APPLICATION:** For use with the CLP SFAM01.0 SOW and revisions.

**CAUTION:** Read instructions carefully before opening bottle(s) and proceeding with the analyses.

Contains Metals in Dilute Acidic or  
Cyanide in Basic Aqueous Solutions  
**HAZARDOUS MATERIAL**

Safety Data Sheets  
Available Upon Request

M5291  
M5292  
M5293  
M5294  
M5295

**(A) SAMPLE DESCRIPTION**

Enclosed is a set of one (1) or more Aqueous Inorganic Reference Materials containing various analyte concentrations. ICV1 and ICV5 are in a matrix of dilute nitric acid. ICV6 is in a matrix of dilute basic solution. **For the reference material source in reporting ICVs use "USEPA". For the reference material lot number for the ICV1, ICV5, and ICV6 solutions use "ICV1-1014", "ICV5-0415", and "ICV6-0400", respectively.**

**(B) BREAKAGE OR MISSING ITEMS**

Check the contents of the shipment carefully for any broken, leaking, or missing items. Check that the seal is intact on each bottle. Refer to the enclosed chain of custody record. Report any problems to Mr. Keith Strout, APTIM Federal Services, LLC, at (702) 895-8722. If requested, return the chain-of-custody record with appropriate annotations and signatures to the address provided below.

QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY  
APTIM Federal Services, LLC  
2700 Chandler Avenue - Building C  
Las Vegas, NV 89120

**(C) ANALYSIS OF SAMPLES**

The Initial Calibration Verification Solutions (ICVs) are to be used to evaluate the accuracy of the initial calibrations of ICP, AA, and Cyanide colorimetric instruments, and are to be used with the CLP SOWs and revisions. The values for each element in the ICVs are listed below in µg/L (ppb) for the resulting solution(s) after the dilution of the concentrate(s) according to the following instructions. Use Class 'A' glassware to prepare the solution(s).

**ICV1-1014** For ICP-AES analysis, use a 10-fold dilution by pipetting 10 mL of the ICV1 concentrate into a 100 mL volumetric flask and dilute to volume with 2% (v/v) nitric acid.





**QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY**  
**"An ISO 9001:2015 Certified Program"**

**Instructions for QATS Reference Material: *Inorganic ICV Solutions***

- ICV1-1014** For ICP-MS analysis, use a 50-fold dilution by pipetting 2 mL of the ICV1 concentrate into a 100 mL volumetric flask and dilute to volume with 1% (v/v) nitric acid.
- ICV5-0415** For the cold vapor analysis of mercury by AA, use a 100-fold dilution by pipetting 1 mL of the ICV5 concentrate into a 100 mL volumetric flask and dilute to volume with 2% (v/v) nitric acid. The ICV5 concentrate is prepared in 0.05% (w/v)  $K_2Cr_2O_7$  and 5% (v/v) nitric acid.
- ICV6-0400** For the analysis of cyanide, use a 100-fold dilution by pipetting 1 mL of the ICV6 concentrate into a 100 mL volumetric flask and dilute to volume with Type II water. Distill this solution along with the samples before analysis. The cyanide concentrate is prepared from  $K_3Fe(CN)_6$ , Type II water, and 0.1 % sodium hydroxide, and will decompose rapidly if exposed to light.

**NOTE:** USE TYPE II WATER AND HIGH-PURITY ACIDS FOR ALL DILUTIONS.

**(D) CERTIFIED CONCENTRATIONS OF QATS ICV1, ICV5, AND ICV6 SOLUTIONS**

| ICV1-1014 |                                                  |                                                  |
|-----------|--------------------------------------------------|--------------------------------------------------|
| Element   | Concentration (µg/L)<br>(after 10-fold dilution) | Concentration (µg/L)<br>(after 50-fold dilution) |
| Al        | 2500                                             | 500                                              |
| Sb        | 1000                                             | 200                                              |
| As        | 1000                                             | 200                                              |
| Ba        | 520                                              | 100                                              |
| Be        | 510                                              | 100                                              |
| Cd        | 510                                              | 100                                              |
| Ca        | 10000                                            | 2000                                             |
| Cr        | 520                                              | 100                                              |
| Co        | 520                                              | 100                                              |
| Cu        | 510                                              | 100                                              |
| Fe        | 10000                                            | 2000                                             |
| Pb        | 1000                                             | 200                                              |
| Mg        | 6000                                             | 1200                                             |
| Mn        | 520                                              | 100                                              |
| Ni        | 530                                              | 110                                              |
| K         | 9900                                             | 2000                                             |
| Se        | 1000                                             | 200                                              |
| Ag        | 250                                              | 50                                               |
| Na        | 10000                                            | 2000                                             |
| Tl        | 1000                                             | 210                                              |
| V         | 500                                              | 100                                              |
| Zn        | 1000                                             | 200                                              |

| ICV5-0415 |                                                   | ICV6-0400       |                                                   |
|-----------|---------------------------------------------------|-----------------|---------------------------------------------------|
| Element   | Concentration (µg/L)<br>(after 100-fold dilution) | Analyte         | Concentration (µg/L)<br>(after 100-fold dilution) |
| Hg        | 4.0                                               | CN <sup>-</sup> | 99                                                |



## Certified Reference Material CRM

## CERTIFIED WEIGHT REPORT:

Part Number:  
Lot Number:  
Description:

58126  
020422  
Iron (Fe)

Lot #

Solvent: 20370011 Nitric Acid

Expiration Date:  
Recommended Storage:  
Nominal Concentration (µg/mL):  
NIST Test Number:

020425  
Ambient (20 °C)  
10000  
6UTB  
5E-05 Balance Uncertainty  
0.058 Flask Uncertainty

Weight shown below was diluted to (mL): 3000.41

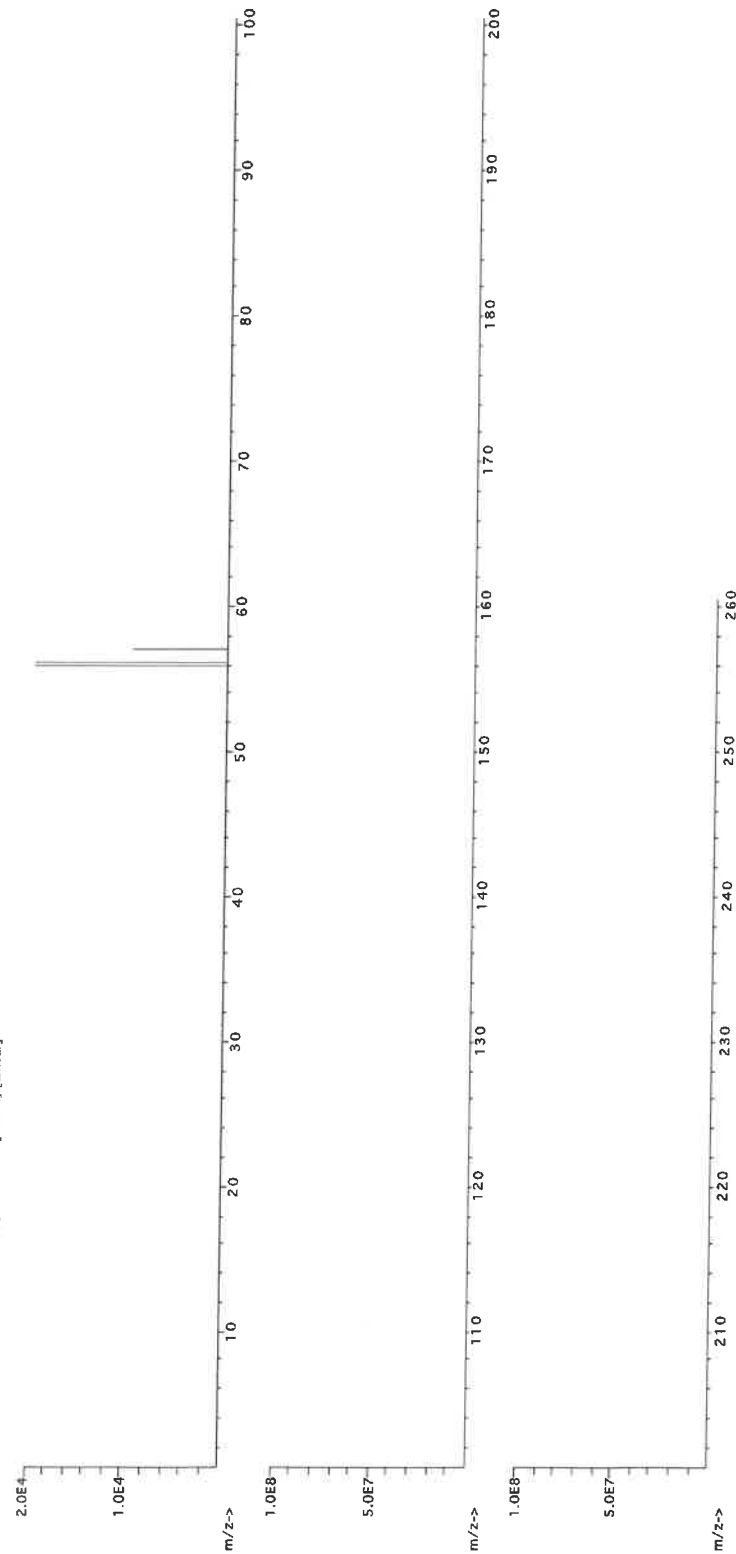
15298  
5.0%  
150.0  
(mL)  
Nitric Acid

|                   |                          |
|-------------------|--------------------------|
| Giovanni Esposito |                          |
| Formulated By:    | Giovanni Esposito 020422 |
| Pedro L. Rentas   |                          |
| Reviewed By:      | Pedro L. Rentas 020422   |

| Compound                                       | Lot Number | Nominal Conc. (µg/mL) | Purity (%) | Uncertainty (%) | Assay (%) | Target Weight (g) | Expanded Uncertainty |                      | CAS# | OSHA PEL (TWA) |
|------------------------------------------------|------------|-----------------------|------------|-----------------|-----------|-------------------|----------------------|----------------------|------|----------------|
|                                                |            |                       |            |                 |           |                   | Actual Weight (g)    | Actual Conc. (µg/mL) |      |                |
| SDS Information (Solvent Safety Info. On Attac |            |                       |            |                 |           |                   |                      |                      |      |                |

1. Iron(III) nitrate nonahydrate (Fe) IN346 221035107 10000 99.999 0.10 100.0 30.0044 30.0090 10001.5 20.0 7782-61-8 5 mg/m3 or-hat 7500mg/kg 3126a

[1] Spectrum No.1 [ 30.763 sec]:58126.D# [Count] [Linear]



57 6/15/22







**Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):**

**Trace Metals Verification by ICP-MS ( $\mu\text{g/mL}$ )**

|    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |
|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|
| Al | <0.02 | Cd | <0.02 | Dy | <0.02 | Hf | <0.02 | Li | <0.02 | Ni | <0.10 | Pr | <0.02 | Se | <0.2  | Tb | <0.02 | W  | <0.02 |
| Sb | <0.02 | Ca | <0.2  | Er | <0.02 | Ho | <0.02 | Lu | <0.02 | Nb | <0.02 | Re | <0.02 | Si | <0.02 | Te | <0.02 | U  | <0.02 |
| As | <0.2  | Ce | <0.02 | Eu | <0.02 | In | <0.01 | Mg | <0.02 | Os | <0.02 | Rh | <0.02 | Ag | <0.02 | Tl | <0.02 | V  | <0.02 |
| Ba | <0.02 | Cs | <0.02 | Gd | <0.02 | Ir | <0.10 | Mn | <0.02 | Pd | <0.02 | Rb | <0.02 | Na | <0.2  | Th | <0.02 | Yb | <0.02 |
| Be | <0.01 | Cr | <0.5  | Ga | <0.2  | Fe | <0.2  | Hg | <0.02 | P  | <0.02 | Ru | <0.02 | Sr | <0.02 | Tm | <0.02 | Y  | <0.02 |
| Bi | <0.02 | Co | <0.10 | Ge | <0.02 | La | <0.10 | Mo | <0.02 | Pt | <0.02 | Sm | <0.02 | S  | <0.02 | Sn | <0.02 | Zn | <0.02 |
| B  | <0.02 | Cu | <0.10 | Au | <0.02 | Pb | <0.02 | Nd | <0.02 | K  | <0.2  | Sc | <0.02 | Ta | <0.02 | Ti | <0.02 | Zr | <0.02 |

(T)= Target analyte

**Physical Characterization:**

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
- \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- \* Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- \* All Standards should be stored with caps tight and under appropriate laboratory conditions.
- \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



**Certified Reference Material CRM**

M5429 R1 0126/23 (B)

**CERTIFIED WEIGHT REPORT:**

**Part Number:**  
**Lot Number:**  
**Description:**

57103  
070622  
Lithium (Li)

**Solvent:** 20510011 Nitric Acid

**Expiration Date:**  
**Recommended Storage:**  
**Nominal Concentration (µg/mL):**  
**NIST Test Number:**

070625  
Ambient (20 °C)  
10000  
6UTB

2% 20.0 (mL)

**Weight shown below was diluted to (mL):** 1000.12  
5E-05 Balance Uncertainty  
0.058 Flask Uncertainty

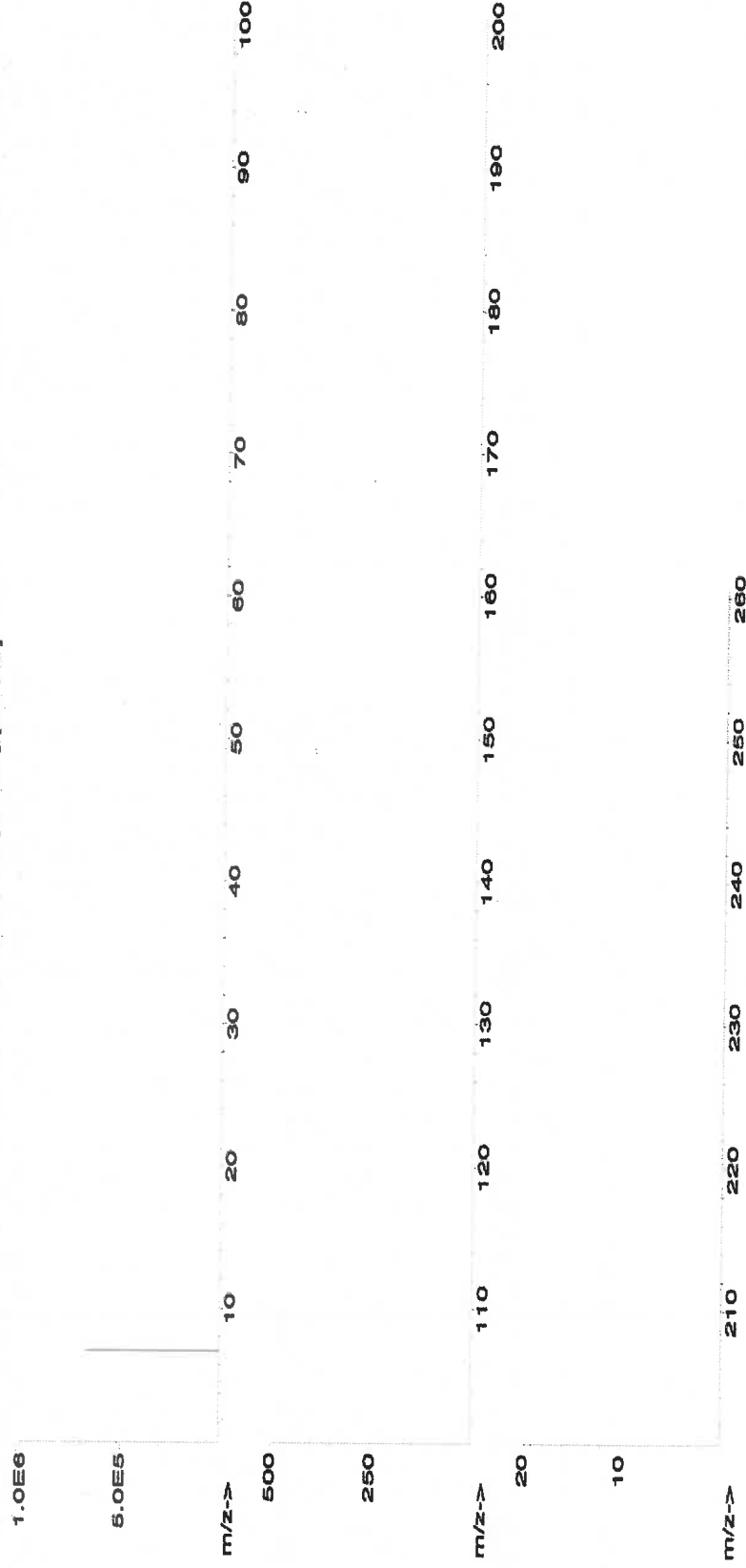
**Lot #**

Formulated By: Lawrence Barry 070622  
Reviewed By: Pedro L. Rentas 070622

| Compound | RM# | Lot Number | Nominal Conc. (µg/mL) | Purity (%) | Uncertainty (%) | Assay (%) | Target Weight (g) | Actual Weight (g) | Conc. (µg/mL) | Expanded Uncertainty +/- (µg/mL) | SDS Information                        |      |          |
|----------|-----|------------|-----------------------|------------|-----------------|-----------|-------------------|-------------------|---------------|----------------------------------|----------------------------------------|------|----------|
|          |     |            |                       |            |                 |           |                   |                   |               |                                  | (Solvent Safety Info. On Attached pg.) | CAS# | NIST SRM |

|                         |       |            |       |        |      |      |          |          |         |      |           |         |                      |
|-------------------------|-------|------------|-------|--------|------|------|----------|----------|---------|------|-----------|---------|----------------------|
| 1. Lithium nitrate (Li) | IN019 | L2042019A1 | 10000 | 99.999 | 0.10 | 10.0 | 100.0134 | 100.0173 | 10000.4 | 20.0 | 7790-69-4 | 5 mg/m3 | of-rat 1426 mg/kg NA |
|-------------------------|-------|------------|-------|--------|------|------|----------|----------|---------|------|-----------|---------|----------------------|

[1] Spectrum No.1 [ 9.619 sec]:58103.D# [Count] [Linear]





Instrumental Analysis by Inductively Coupled Plasma Mass Spectroscopy (ICP-MS):

Trace Metals Verification by ICP-MS (µg/mL)

|    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |
|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|
| Al | <0.02 | Cd | <0.02 | Dy | <0.02 | Hf | <0.02 | Li | <0.02 | Ni | <0.02 | Pr | <0.02 | Se | <0.2  | Tb | <0.02 | W  | <0.02 |
| Sb | <0.02 | Ca | <0.2  | Er | <0.02 | Ho | <0.02 | La | <0.02 | Nb | <0.02 | Re | <0.02 | Si | <0.02 | Te | <0.02 | U  | <0.02 |
| As | <0.2  | Ce | <0.02 | Eu | <0.02 | In | <0.02 | Mg | <0.01 | Os | <0.02 | Rh | <0.02 | Ag | <0.02 | Tl | <0.02 | V  | <0.02 |
| Ba | <0.02 | Cs | <0.02 | Gd | <0.02 | Ir | <0.02 | Mn | <0.02 | Pd | <0.02 | Rb | <0.02 | Na | <0.2  | Th | <0.02 | Yb | <0.02 |
| Be | <0.01 | Cr | <0.02 | Ga | <0.02 | Fe | <0.2  | Hg | <0.2  | P  | <0.02 | Ru | <0.02 | Sr | <0.02 | Tm | <0.02 | Y  | <0.02 |
| Bi | <0.02 | Co | <0.02 | Ge | <0.02 | La | <0.02 | Mo | <0.02 | Pt | <0.02 | Sm | <0.02 | S  | <0.02 | Sn | <0.02 | Zn | <0.02 |
| B  | <0.02 | Cu | <0.02 | Au | <0.02 | Pb | <0.02 | Nd | <0.02 | K  | <0.2  | Sc | <0.02 | Ta | <0.02 | Ti | <0.02 | Zr | <0.02 |

(T) = Target analyte

Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
- \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- \* Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- \* All Standards should be stored with caps tight and under appropriate laboratory conditions.
- \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



AN 5466

Certified Reference Material CRM



ANAB ISO 17034 Accredited  
AFR-1539 Certificate Number  
https://AbsoluteStandards.com

**CERTIFIED WEIGHT REPORT:**

**Part Number:** 57058  
**Lot Number:** 061322  
**Description:** Cerium (Ce)

**Solvent:** 20510011 Nitric Acid

Lot #

**Expiration Date:** 061325

2% 20.0 (mL) Nitric Acid

**Recommended Storage:** Ambient (20 °C)

**Nominal Concentration (µg/mL):** 1000

6UTB

5E-05 Balance Uncertainty

**Weight shown below was diluted to (mL):** 1000.12 0.058 Flask Uncertainty

|                          |                   |
|--------------------------|-------------------|
| <i>Lawrence Barry</i>    |                   |
| Formulated By:           | Lawrence Barry    |
|                          | 061322            |
| <i>Pedro L. Renteria</i> |                   |
| Reviewed By:             | Pedro L. Renteria |
|                          | 061322            |

**Compound**

Lot Number

Nominal Conc. (µg/mL)

Purity (%)

Uncertainty (%)

Assay (%)

Target Weight (g)

Actual Weight (g)

Actual Conc. (µg/mL)

Expanded Uncertainty +/- (µg/mL)

CAS#

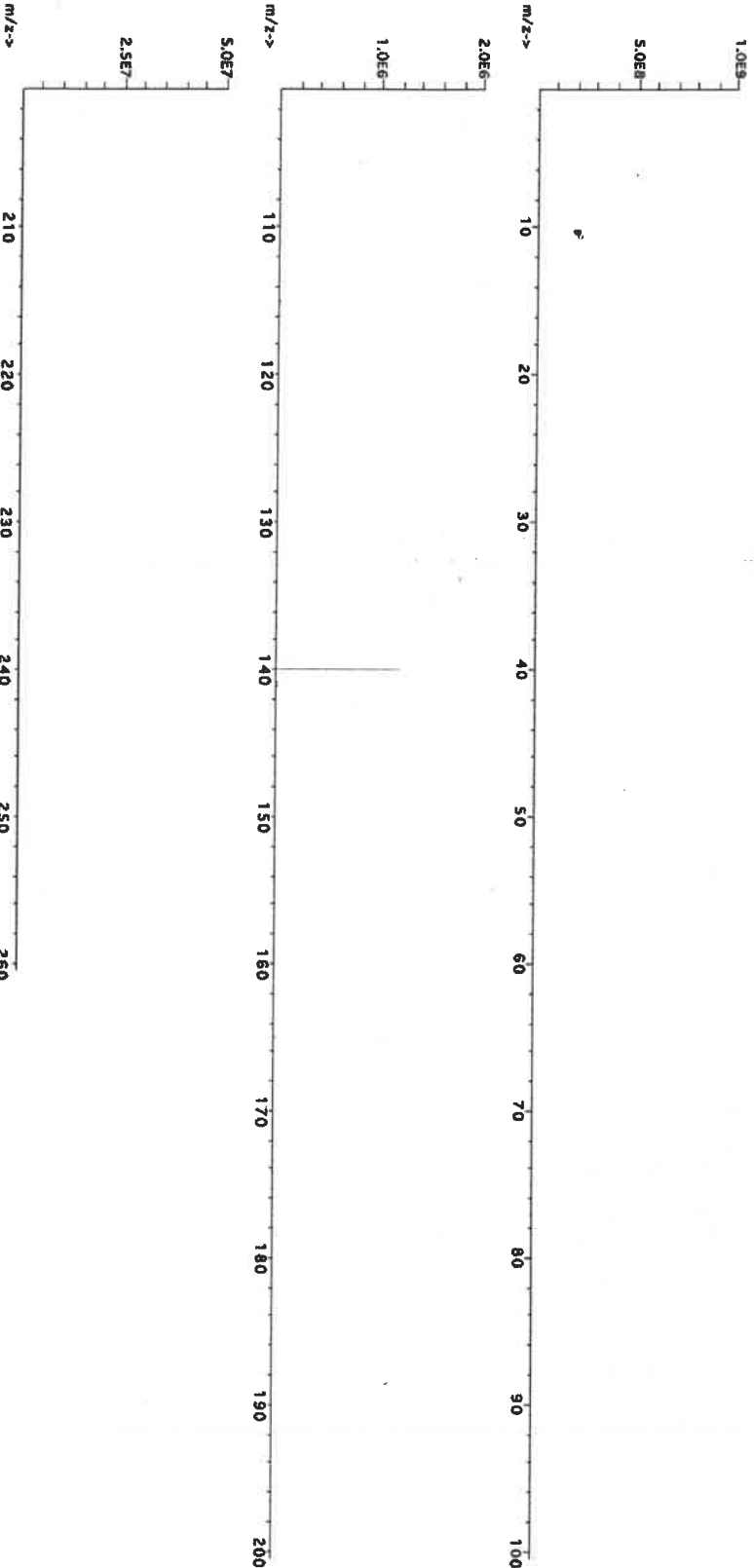
OSHA PEL (TWA)

LD50

SRM

1. Cerium nitrate hexahydrate (Ce) IN146 Z512CEB1 1000 99.999 0.10 32.8 3.04919 3.04923 1000.0 2.0 10294-41-4 NA NA NA

[1] Spectrum No.1 [ 43.472 sec; 158.00e [Count] [Linear]





## Instrumental Analysis by Inductively Coupled Plasma Mass Spectroscopy (ICP-MS):

Trace Metals Verification by ICP-MS ( $\mu\text{g/mL}$ )

|    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |
|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|
| Al | <0.02 | Cd | <0.02 | Dy | <0.02 | Er | <0.02 | Ho | <0.02 | Li | <0.02 | Ni | <0.02 | Pt | <0.02 | Se | <0.2  | Tb | <0.02 | W  | <0.02 |
| Sb | <0.02 | Ca | <0.2  | Er | <0.02 | Eu | <0.02 | In | <0.02 | Lu | <0.02 | Nb | <0.02 | Rc | <0.02 | Si | <0.02 | Te | <0.02 | U  | <0.02 |
| As | <0.2  | Ce | T     |    |       |    |       |    |       | Mg | <0.01 | Os | <0.02 | Rh | <0.02 | Ag | <0.02 | Tl | <0.02 | V  | <0.02 |
| Ba | <0.02 | Cs | <0.02 | Gd | <0.02 |    |       | Ir | <0.02 | Mn | <0.02 | Pd | <0.02 | Rb | <0.02 | Na | <0.2  | Th | <0.02 | Yb | <0.02 |
| Be | <0.01 | Cr | <0.02 | Ga | <0.02 |    |       | Fe | <0.2  | Hg | <0.2  | P  | <0.02 | Ru | <0.02 | Sr | <0.02 | Tm | <0.02 | Y  | <0.02 |
| Bi | <0.02 | Co | <0.02 | Ge | <0.02 |    |       | La | <0.02 | Mo | <0.02 | Pr | <0.02 | Sm | <0.02 | S  | <0.02 | Sn | <0.02 | Zn | <0.02 |
| B  | <0.02 | Cu | <0.02 | Au | <0.02 |    |       | Pb | <0.02 | Nd | <0.02 | K  | <0.2  | Sc | <0.02 | Ta | <0.02 | Ti | <0.02 | Zr | <0.02 |

(T)= Target analyte

## Physical Characterization:

Certified by:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
- \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- \* Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- \* All standards should be stored with caps tight and under appropriate laboratory conditions.
- \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



**Certified Reference Material CRM**



**CERTIFIED WEIGHT REPORT:**

Part Number: **58113**  
Lot Number: **011623**  
Description: **Aluminum (Al)**

Solvent: **20510011 Nitric Acid**

Lot #

**R 17/20/23**

Part Number: **58113**  
Lot Number: **011623**  
Description: **Aluminum (Al)**

Expiration Date: **011626**

Recommended Storage: **Ambient (20 °C)**

Nominal Concentration (µg/mL): **10000**

NIST Test Number: **6UTB**

Weight shown below was diluted to (mL): **2000.02**

5E-05 Balance Uncertainty

0.058 Flask Uncertainty

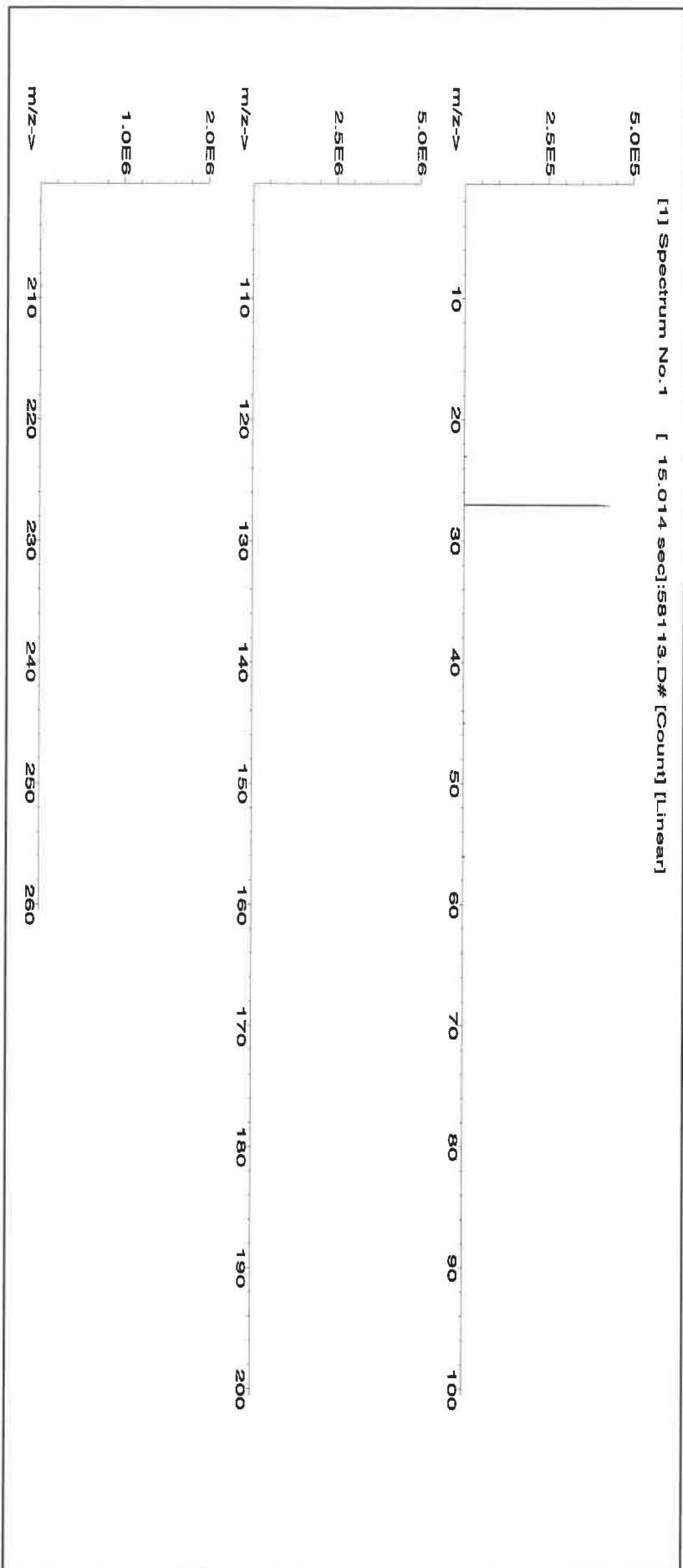
2% 40.0 (mL) Nitric Acid

|                          |                   |
|--------------------------|-------------------|
| <i>Giovanni Esposito</i> |                   |
| Formulated By:           | Giovanni Esposito |
|                          | 011623            |
| <i>Pedro L. Rentas</i>   |                   |
| Reviewed By:             | Pedro L. Rentas   |
|                          | 011623            |

**SDS Information**

| Compound                             | Lot         | Nominal Conc. (µg/mL) | Purity (%) | Uncertainty (%) | Assay (%) | Target Weight (g) | Actual Weight (g) | Actual Conc. (µg/mL) | Expanded Uncertainty +/- (µg/mL) | CAS#      | OSHA PEL (TWA) | LD50              | NIST SRM |
|--------------------------------------|-------------|-----------------------|------------|-----------------|-----------|-------------------|-------------------|----------------------|----------------------------------|-----------|----------------|-------------------|----------|
| 1. Aluminum nitrate nonahydrate (Al) | ALM112021A1 | 10000                 | 99.999     | 0.10            | 7.30      | 273.9779          | 274.0078          | 10001.1              | 20.0                             | 7784-27-2 | 2 mg/m3        | or-hat 3671 mg/kg | 3101a    |

[1] Spectrum No. 1 [ 15.014 sec]:58113.D# [Count] [Linear]







# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

| Trace Metals Verification by ICP-MS (µg/mL) |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |
|---------------------------------------------|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|
| Al                                          | <0.02 | Cd | <0.02 | Dy | <0.02 | Hf | <0.02 | Li | <0.02 | Ni | <0.02 | Pt | <0.02 | Se | <0.2  | Tb | <0.02 |
| Sb                                          | <0.02 | Ca | <0.02 | Er | <0.02 | Ho | <0.02 | Lu | <0.02 | Nb | <0.02 | Re | <0.02 | Si | <0.02 | Tc | <0.02 |
| As                                          | <0.2  | Ce | <0.02 | Eu | <0.02 | In | <0.02 | Mg | <0.02 | Os | <0.01 | Rh | <0.02 | Ag | <0.02 | Ti | <0.02 |
| Ba                                          | <0.02 | Cs | <0.02 | Gd | <0.02 | Ir | <0.02 | Mn | <0.02 | Pd | <0.02 | Rb | <0.02 | Na | <0.2  | Th | <0.02 |
| Be                                          | <0.01 | Cr | <0.02 | Ga | <0.2  | Fe | <0.02 | Hg | <0.2  | P  | <0.02 | Ru | <0.02 | Sr | <0.02 | Tm | <0.02 |
| Bi                                          | <0.02 | Co | <0.02 | Ge | <0.02 | La | <0.02 | Mo | <0.02 | Pt | <0.02 | Sm | <0.02 | S  | <0.02 | Sn | <0.02 |
| B                                           | <0.02 | Cu | <0.02 | Au | <0.02 | Pb | <0.02 | Nd | <0.02 | K  | <0.2  | Sc | <0.02 | Ta | <0.02 | Tl | <0.02 |
|                                             |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       | W  | <0.02 |
|                                             |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       | U  | <0.02 |
|                                             |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       | V  | <0.02 |
|                                             |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       | Yb | <0.02 |
|                                             |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       | Y  | <0.02 |
|                                             |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       | Zn | <0.02 |
|                                             |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       | Zr | <0.02 |

(T) = Target analyte

## Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
- \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- \* Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- \* All Standards should be stored with caps tight and under appropriate laboratory conditions.
- \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



**CERTIFIED WEIGHT REPORT:**

**Part Number:**  
**Lot Number:**  
**Description:**

**57182**  
**061522**  
**Lead (Pb)**

**Expiration Date:**  
**Recommended Storage:**  
**Nominal Concentration (µg/mL):**  
**NIST Test Number:**

**061525**  
**Ambient (20 °C)**  
**10000**  
**6UTB**

**Weight shown below was diluted to (mL):**

**2000.02**

**5E-05 Balance Uncertainty**

**0.058 Flask Uncertainty**

**Lot #**

**Solvent:** 20510011 Nitric Acid

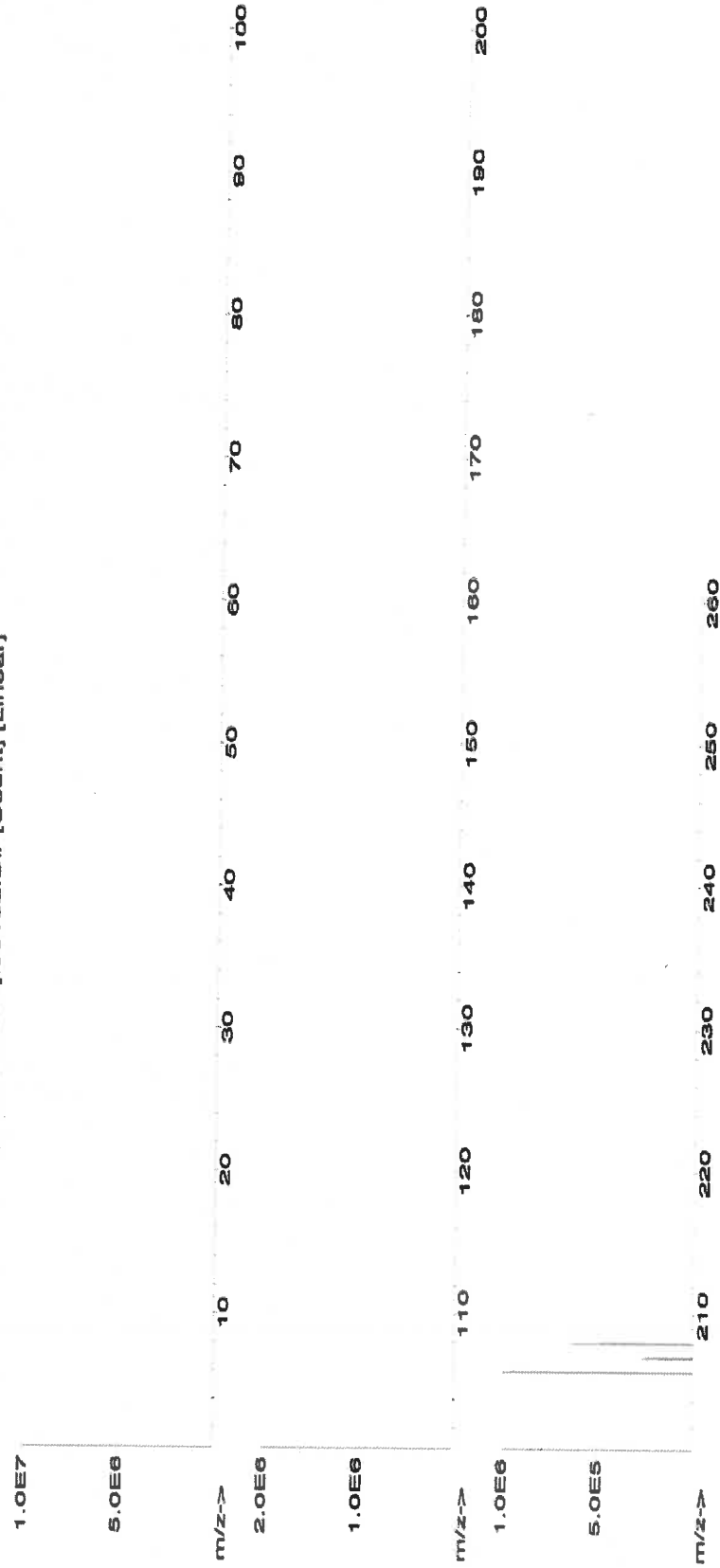
**2%** 40.0 Nitric Acid  
(mL)

|                          |                          |
|--------------------------|--------------------------|
| <i>Giovanni Esposito</i> |                          |
| Formulated By:           | Giovanni Esposito 061522 |
| <i>Pedro L. Rentas</i>   |                          |
| Reviewed By:             | Pedro L. Rentas 061522   |

| Compound | RM# | Lot Number | Nominal Conc. (µg/mL) | Purity (%) | Uncertainty (%) | Assay (%) | Target Weight (g) | Actual Weight (g) | Actual Conc. (µg/mL) | Expanded Uncertainty +/- (µg/mL) | SDS Information                        |                |          |
|----------|-----|------------|-----------------------|------------|-----------------|-----------|-------------------|-------------------|----------------------|----------------------------------|----------------------------------------|----------------|----------|
|          |     |            |                       |            |                 |           |                   |                   |                      |                                  | (Solvent Safety Info. On Attached pg.) | OSHA PEL (TWA) | NIST SRM |

|                          |       |             |       |        |      |      |         |         |         |      |            |            |                          |
|--------------------------|-------|-------------|-------|--------|------|------|---------|---------|---------|------|------------|------------|--------------------------|
| 1. Lead(II) nitrate (Pb) | IN029 | PBD12201641 | 10000 | 99.999 | 0.10 | 82.5 | 32.0006 | 32.0041 | 10001.1 | 20.0 | 10098-74-8 | 0.05 mg/m3 | inhalation 88 mg/kg 3128 |
|--------------------------|-------|-------------|-------|--------|------|------|---------|---------|---------|------|------------|------------|--------------------------|

[1] Spectrum No.1 [ 17.284 sec]:58182.D# [Count] [Linear]





# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

## Trace Metals Verification by ICP-MS (µg/mL)

|    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |
|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|
| Al | <0.02 | Cd | <0.02 | Dy | <0.02 | Hf | <0.02 | Li | <0.02 | Ni | <0.02 | Pr | <0.02 | Se | <0.2  | Tb | <0.02 | W  | <0.02 |
| Sb | <0.02 | Ca | <0.2  | Er | <0.02 | Ho | <0.02 | Lu | <0.02 | Nb | <0.02 | Re | <0.02 | Si | <0.02 | Te | <0.02 | U  | <0.02 |
| As | <0.2  | Ce | <0.02 | Eu | <0.02 | In | <0.02 | Mg | <0.01 | Os | <0.02 | Rh | <0.02 | Ag | <0.02 | Tl | <0.02 | V  | <0.02 |
| Ba | <0.02 | Cs | <0.02 | Gd | <0.02 | Ir | <0.02 | Mn | <0.02 | Pd | <0.02 | Rb | <0.02 | Na | <0.2  | Th | <0.02 | Yb | <0.02 |
| Be | <0.01 | Cr | <0.02 | Ga | <0.2  | Fe | <0.02 | Hg | <0.2  | P  | <0.02 | Ru | <0.02 | Sr | <0.02 | Tm | <0.02 | Y  | <0.02 |
| Bi | <0.02 | Co | <0.02 | Ge | <0.02 | La | <0.02 | Mo | <0.02 | Pr | <0.02 | Sm | <0.02 | S  | <0.02 | Sn | <0.02 | Zn | <0.02 |
| B  | <0.02 | Cu | <0.02 | Au | <0.02 | Pb | <0.02 | Nd | <0.02 | K  | <0.2  | Sc | <0.02 | Ta | <0.02 | Ti | <0.02 | Zr | <0.02 |

(T)= Target analyte

## Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
- \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- \* Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- \* All Standards should be stored with caps tight and under appropriate laboratory conditions.
- \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



**Certified Reference Material CRM**

**CERTIFIED WEIGHT REPORT:**

Part Number: **58119**  
Lot Number: **120822**  
Description: **Potassium (K)**

Solvent: 20510011 Nitric Acid

Lot #

Expiration Date: 120825  
Recommended Storage: Ambient (20 °C)  
Nominal Concentration (µg/mL): 10000  
NIST Test Number: 6UTB

2% 60.0 (mL) Nitric Acid

Weight shown below was diluted to (mL): 3000.4

5E-05 Balance Uncertainty  
0.06 Flask Uncertainty

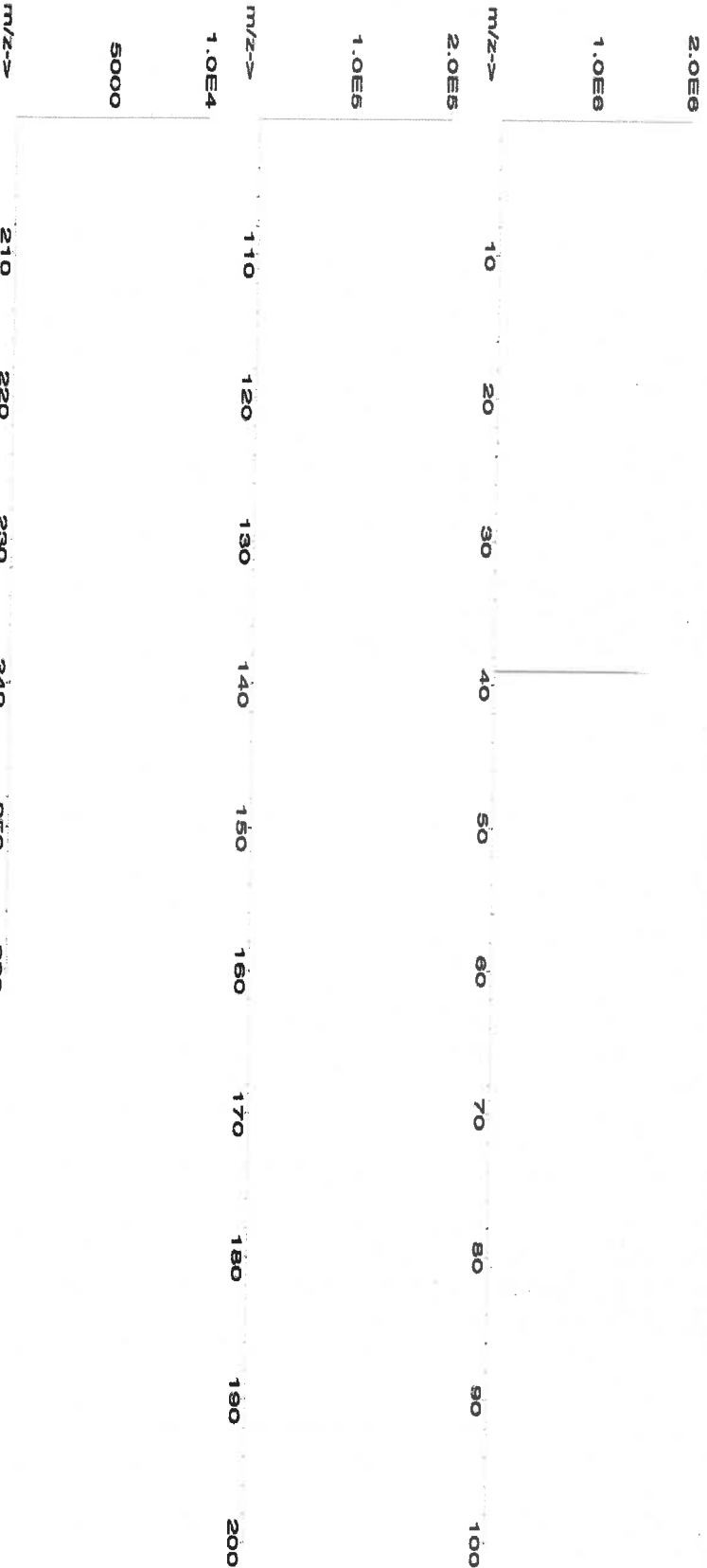
|                          |                          |
|--------------------------|--------------------------|
| <i>Giovanni Esposito</i> |                          |
| Formulated By:           | Giovanni Esposito        |
| Reviewed By:             | <i>Pedro L. Renteria</i> |
|                          | 120822                   |

**Compound**

| Lot | Nominal | Purity        | Uncertainty | Assay      | Target | Actual     | Actual     | Expanded      | SDS Information | NIST                                   |
|-----|---------|---------------|-------------|------------|--------|------------|------------|---------------|-----------------|----------------------------------------|
| RM# | Number  | Conc. (µg/mL) | (%)         | Purity (%) | (%)    | Weight (g) | Weight (g) | Conc. (µg/mL) | Uncertainty     | (Solvent Safety Info. On Attached pg.) |
|     |         |               |             |            |        |            |            | +/- (µg/mL)   | CAS#            | OSHA PEL (TWA)                         |
|     |         |               |             |            |        |            |            |               |                 | LD50                                   |

1. Potassium nitrate (K) IN034 KD022021A1 10000 99.989 0.10 37.6 79.7990 79.8075 10001.1 20.0 7757-79-1 5 mg/m3 crtat 3015 mg/kg 3141a

[1] Spectrum No.1 [ 35.763 sec]:58119.D# [Count] [Linear]





**Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):**

**Trace Metals Verification by ICP-MS (µg/mL)**

|    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |
|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|
| Al | <0.02 | Cd | <0.02 | Dy | <0.02 | Hf | <0.02 | Li | <0.02 | Ni | <0.02 | Pt | <0.02 | Se | <0.2  | Tb | <0.02 | W  | <0.02 |
| Sb | <0.02 | Ca | <0.2  | Er | <0.02 | Ho | <0.02 | Lu | <0.02 | Nb | <0.02 | Re | <0.02 | Si | <0.02 | Te | <0.02 | U  | <0.02 |
| As | <0.2  | Ce | <0.02 | Eu | <0.02 | In | <0.02 | Mg | <0.01 | Os | <0.02 | Rh | <0.02 | Ag | <0.02 | Tl | <0.02 | V  | <0.02 |
| Ba | <0.02 | Cs | <0.02 | Gd | <0.02 | Ir | <0.02 | Mn | <0.02 | Pd | <0.02 | Rb | <0.02 | Na | <0.2  | Th | <0.02 | Yb | <0.02 |
| Be | <0.01 | Cr | <0.02 | Ga | <0.02 | Fe | <0.2  | Hg | <0.2  | P  | <0.02 | Ru | <0.02 | Sr | <0.02 | Tm | <0.02 | Y  | <0.02 |
| Bi | <0.02 | Co | <0.02 | Ge | <0.02 | La | <0.02 | Mo | <0.02 | Pt | <0.02 | Sm | <0.02 | S  | <0.02 | Sn | <0.02 | Zn | <0.02 |
| B  | <0.02 | Cu | <0.02 | Au | <0.02 | Pb | <0.02 | Nd | <0.02 | K  | <0.02 | Sc | <0.02 | Ta | <0.02 | Ti | <0.02 | Zr | <0.02 |

(T) = Target analyte

**Physical Characterization:**

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
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- \* All standards should be stored with caps tight and under appropriate laboratory conditions.
- \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

# Certificate of Analysis

300 Technology Drive  
 Christiansburg, VA 24073 USA  
 inorganicventures.com

P: 800-669-6799/540-585-3030

F: 540-585-3012

info@inorganicventures.com

## 1.0 ACCREDITATION / REGISTRATION

**INORGANIC VENTURES** is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



## 2.0 PRODUCT DESCRIPTION

Product Code: Multi Analyte Custom Grade Solution  
 Catalog Number: CLPP-SPK-1  
 Lot Number: T2-MEB721963  
 Matrix: 7% (v/v) HNO<sub>3</sub>  
 Value / Analyte(s):  
     2 000 µg/mL ea:  
     Aluminum, Barium,  
     1 000 µg/mL ea:  
     Iron,  
     500 µg/mL ea:  
     Manganese, Nickel,  
     Vanadium, Zinc,  
     Cobalt,  
     250 µg/mL ea:  
     Copper,  
     200 µg/mL ea:  
     Chromium,  
     50 µg/mL ea:  
     Beryllium, Silver

## 3.0 CERTIFIED VALUES AND UNCERTAINTIES

| ANALYTE       | CERTIFIED VALUE    | ANALYTE       | CERTIFIED VALUE    |
|---------------|--------------------|---------------|--------------------|
| Aluminum, Al  | 2 000 ± 7 µg/mL    | Barium, Ba    | 2 000 ± 9 µg/mL    |
| Beryllium, Be | 50.00 ± 0.26 µg/mL | Chromium, Cr  | 200.0 ± 1.1 µg/mL  |
| Cobalt, Co    | 500.0 ± 2.4 µg/mL  | Copper, Cu    | 250.0 ± 1.0 µg/mL  |
| Iron, Fe      | 1 000 ± 4 µg/mL    | Manganese, Mn | 500.0 ± 2.0 µg/mL  |
| Nickel, Ni    | 500.0 ± 2.2 µg/mL  | Silver, Ag    | 50.00 ± 0.22 µg/mL |
| Vanadium, V   | 500.0 ± 2.2 µg/mL  | Zinc, Zn      | 500.0 ± 2.2 µg/mL  |

Density: 1.070 g/mL (measured at 20 ± 4 °C)

Assay Information:

| ANALYTE | METHOD      | NIST SRM# | SRM LOT#     |
|---------|-------------|-----------|--------------|
| Ag      | ICP Assay   | 3151      | 160729       |
| Ag      | Volhard     | 999c      | 999c         |
| Ag      | Calculated  |           | See Sec. 4.2 |
| Al      | ICP Assay   | 3101a     | 140903       |
| Al      | EDTA        | 928       | 928          |
| Ba      | ICP Assay   | 3104a     | 140909       |
| Ba      | Gravimetric |           | See Sec. 4.2 |
| Be      | ICP Assay   | 3105a     | 090514       |
| Be      | Calculated  |           | See Sec. 4.2 |
| Co      | ICP Assay   | 3113      | 190630       |
| Co      | EDTA        | 928       | 928          |
| Cr      | ICP Assay   | 3112a     | 170630       |
| Cu      | ICP Assay   | 3114      | 121207       |
| Cu      | EDTA        | 928       | 928          |
| Fe      | ICP Assay   | 3126a     | 140812       |
| Fe      | EDTA        | 928       | 928          |
| Mn      | ICP Assay   | 3132      | 050429       |
| Mn      | EDTA        | 928       | 928          |
| Ni      | ICP Assay   | 3136      | 120619       |
| Ni      | EDTA        | 928       | 928          |
| V       | IC Assay    | 3165      | 160906       |
| V       | EDTA        | 928       | 928          |
| Zn      | ICP Assay   | 3168a     | 120629       |
| Zn      | EDTA        | 928       | 928          |

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of  $k = 2$ .

#### Characterization of CRM/RM by Two or More Methods

Certified Value,  $X_{CRM/RM}$ , where two or more methods of characterization are used is the weighted mean of the results:

$$X_{CRM/RM} = \sum (w_i) (X_i)$$

$X_i$  = mean of Assay Method  $i$  with standard uncertainty  $u_{char\ i}$

$w_i$  = the weighting factors for each method calculated using the inverse square of the variance:

$$w_i = (1/u_{char\ i}^2) / (\sum (1/u_{char\ i}^2))$$

$$CRM/RM \text{ Expanded Uncertainty } (k) = U_{CRM/RM} = k (u_{char}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$$

$k$  = coverage factor = 2

$u_{char} = [\sum (w_i)^2 (u_{char\ i})^2]^{1/2}$  where  $u_{char\ i}$  are the errors from each characterization method

$u_{bb}$  = bottle to bottle homogeneity standard uncertainty

$u_{lts}$  = long term stability standard uncertainty (storage)

$u_{ts}$  = transport stability standard uncertainty

#### Characterization of CRM/RM by One Method

Certified Value,  $X_{CRM/RM}$ , where one method of characterization is used is the mean of individual results:

$$X_{CRM/RM} = (\bar{X}_a) (u_{char\ a})$$

$\bar{X}_a$  = mean of Assay Method A with

$u_{char\ a}$  = the standard uncertainty of characterization Method A

$$CRM/RM \text{ Expanded Uncertainty } (k) = U_{CRM/RM} = k (u_{char\ a}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$$

$k$  = coverage factor = 2

$u_{char\ a}$  = the errors from characterization

$u_{bb}$  = bottle to bottle homogeneity standard uncertainty

$u_{lts}$  = long term stability standard uncertainty (storage)

$u_{ts}$  = transport stability standard uncertainty

## 4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

#### **4.1 Thermometer Calibration**

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

#### **4.2 Balance Calibration**

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

#### **4.3 Glassware Calibration**

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

### **5.0 TRACE METALLIC IMPURITIES (TMI ) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)**

N/A

### **6.0 INTENDED USE**

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

### **7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL**

#### **7.1 Storage and Handling Recommendations**

- Store between approximately 4° - 30° C while in sealed TCT bag.
- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.
- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit [www.inorganicventures.com/TCT](http://www.inorganicventures.com/TCT)

**Note:** This solution contains Silver (Ag), please refer to our Sample Preparation Guide for more information.

<https://www.inorganicventures.com/sample-preparation-guide/samples-containing-silver>

### **8.0 HAZARDOUS INFORMATION**

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

### **9.0 HOMOGENEITY**

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

### **10.0 QUALITY STANDARD DOCUMENTATION**

#### **10.1 ISO 9001 Quality Management System Registration**

- QSR Certificate Number QSR-1034

#### **10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"**

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

#### **10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"**

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va, 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; [inorganicventures.com](http://inorganicventures.com); [info@inorganicventures.com](mailto:info@inorganicventures.com)

## 11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

### 11.1 Certification Issue Date

July 27, 2022

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

### 11.2 Lot Expiration Date

- July 27, 2027

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

### 11.3 Period of Validity

- Sealed TCT Bag Open Date: \_\_\_\_\_

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

## 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

### Certificate Approved By:

Thomas Kozikowski  
Manager, Quality Control



### Certifying Officer:

Paul Gaines  
Chairman / Senior Technical Director







**CERTIFIED WEIGHT REPORT:**

Part Number: 58024  
Lot Number: 060523  
Description: Chromium (Cr)

Lot #  
21110221  
Solvent: Nitric Acid

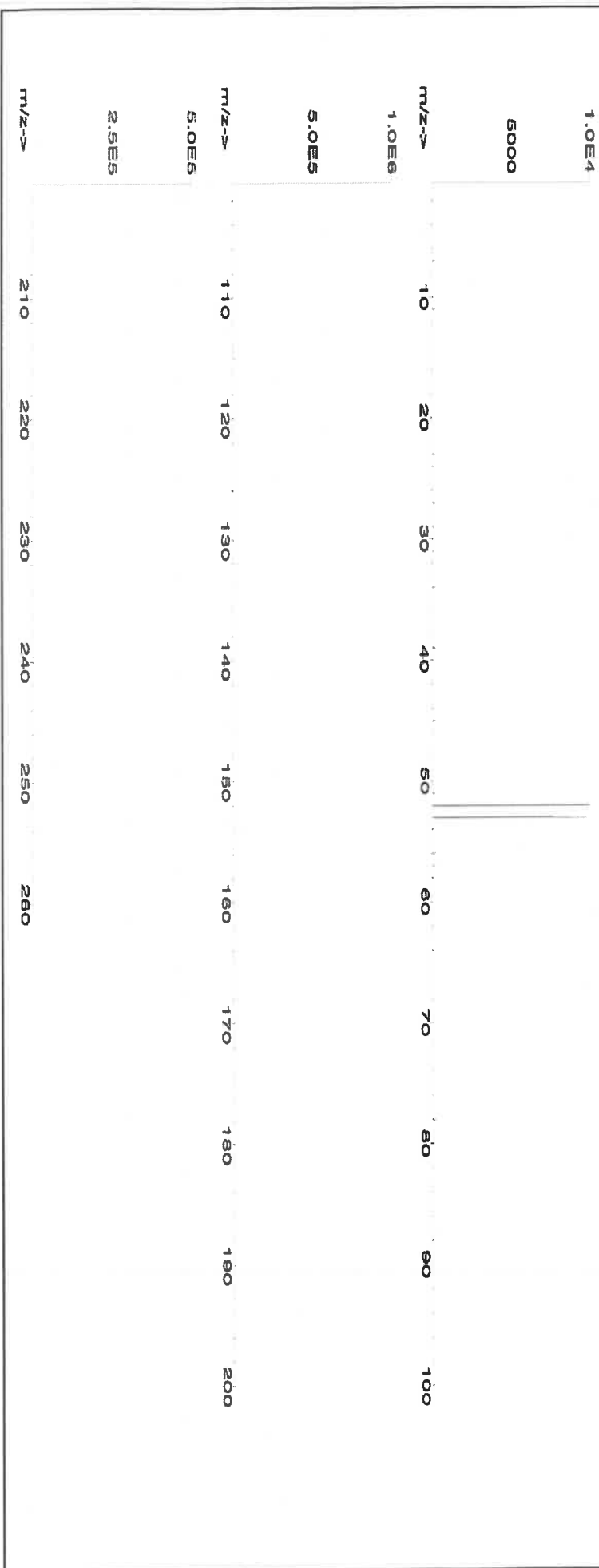
|                |                 |
|----------------|-----------------|
|                |                 |
| Formulated By: | Lawrence Barry  |
|                | 060523          |
|                |                 |
| Reviewed By:   | Pedro L. Ruelas |
|                | 060523          |

Expiration Date: 060526  
Recommended Storage: Ambient (20 °C)  
Nominal Concentration (µg/mL): 1000  
NIST Test Number: 6UTB  
Volume shown below was diluted to (mL): 2000.02  
5E-05 Balance Uncertainty  
0.058 Flask Uncertainty

| Compound | Part Number | Lot Number | Dilution Factor | Initial Vol. (mL) | Uncertainty (mL) | Nominal Conc. (µg/mL) | Initial Conc. (µg/mL) | Final Conc. (µg/mL) | Expanded Uncertainty +/- (µg/mL) | CAS# | OSHA PEL (TWA) | LD50 | NIST SRM |
|----------|-------------|------------|-----------------|-------------------|------------------|-----------------------|-----------------------|---------------------|----------------------------------|------|----------------|------|----------|
|----------|-------------|------------|-----------------|-------------------|------------------|-----------------------|-----------------------|---------------------|----------------------------------|------|----------------|------|----------|

1. Chromium(III) nitrate nonahydrate (Cr) 58124 071122 0.1000 200.0 0.084 1000 10000.1 1000.0 2.2 7789-02-8 0.5 mg(Cr)/m3 or rat 3250 mg/kg 3112a

[1] Spectrum No.1 [31.393 sec]:57024.D# [Count] [Linear]





**Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):**

**Trace Metals Verification by ICP-MS (µg/mL)**

|    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |
|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|
| Al | <0.02 | Cd | <0.02 | Dy | <0.02 | Hf | <0.02 | Li | <0.02 | Ni | <0.02 | Pr | <0.02 | Se | <0.2  | Tb | <0.02 | W  | <0.02 |
| Sb | <0.02 | Ca | <0.2  | Er | <0.02 | Ho | <0.02 | Lu | <0.02 | Nb | <0.02 | Re | <0.02 | Si | <0.02 | Te | <0.02 | U  | <0.02 |
| As | <0.2  | Ce | <0.02 | Eu | <0.02 | In | <0.02 | Mg | <0.01 | Os | <0.02 | Rh | <0.02 | Ag | <0.02 | Tl | <0.02 | V  | <0.02 |
| Ba | <0.02 | Cs | <0.02 | Gd | <0.02 | Ir | <0.02 | Mn | <0.02 | Pd | <0.02 | Rb | <0.02 | Na | <0.2  | Th | <0.02 | Yb | <0.02 |
| Be | <0.01 | Cr | T     | Ga | <0.02 | Fe | <0.2  | Hg | <0.2  | P  | <0.02 | Ru | <0.02 | Sr | <0.02 | Tm | <0.02 | Y  | <0.02 |
| Bi | <0.02 | Co | <0.02 | Ge | <0.02 | La | <0.02 | Mo | <0.02 | Pt | <0.02 | Sm | <0.02 | S  | <0.02 | Sn | <0.02 | Zn | <0.02 |
| B  | <0.02 | Cu | <0.02 | Au | <0.02 | Pb | <0.02 | Nd | <0.02 | K  | <0.2  | Sc | <0.02 | Ta | <0.02 | Ti | <0.02 | Zr | <0.02 |

(T) = Target analyte

**Physical Characterization:**

Homogeneity: No heterogeneity was observed in the preparation of this standard.

**Certified by:**

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
- \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- \* Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- \* All standards should be stored with caps tight and under appropriate laboratory conditions.
- \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



**CERTIFIED WEIGHT REPORT:**

**Part Number:** 58029  
**Lot Number:** 102523  
**Description:** Copper (Cu)

**Lot #** 24002546  
**Solvent:** Nitric Acid

**Expiration Date:** 102526

2.0%

40.0 (mL)

Nitric Acid

**Recommended Storage:** Ambient (20 °C)

**Nominal Concentration (µg/mL):** 1000

**NIST Test Number:** 6UTB

5E-05 Balance Uncertainty

**Volume shown below was diluted to (mL):** 2000.02

0.058 Flask Uncertainty

*Formulated By:* Benson Chan 102523

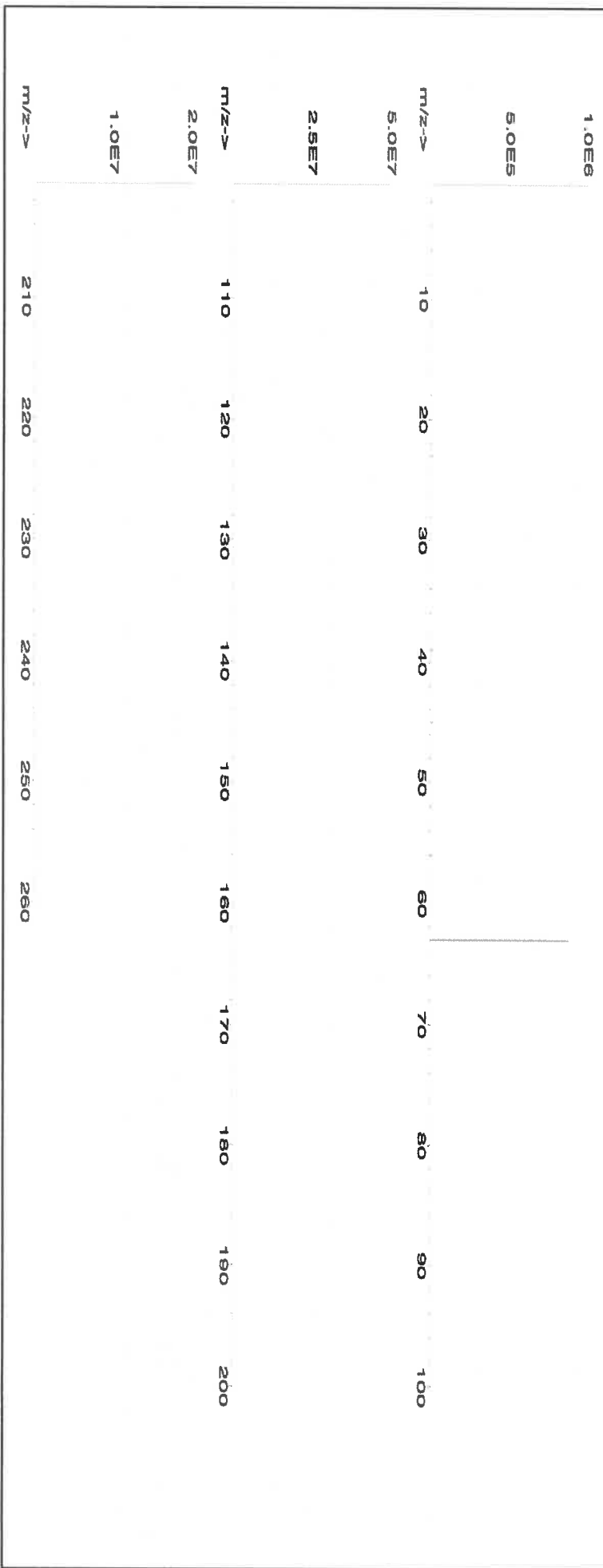
*Reviewed By:* Pedro L. Rentas 102523

**SDS Information**

| Compound | Part Number | Lot Number | Dilution Factor | Initial Vol. (mL) | Uncertainty Pipette (mL) | Nominal Conc. (µg/mL) | Initial Conc. (µg/mL) | Final Conc. (µg/mL) | Expanded Uncertainty +/- (µg/mL) | CAS# | OSHA PEL (TWA) | LD50 | NIST SRM |
|----------|-------------|------------|-----------------|-------------------|--------------------------|-----------------------|-----------------------|---------------------|----------------------------------|------|----------------|------|----------|
|----------|-------------|------------|-----------------|-------------------|--------------------------|-----------------------|-----------------------|---------------------|----------------------------------|------|----------------|------|----------|

1. Copper(II) nitrate trihydrate (Cu) 58129 100223 0.1000 200.0 0.084 1000 10000.1 1000.0 2.2 10031-43-3 1 mg/m3 or-rat 794 mg/kg 3114

[1] Spectrum No.1 [ 33.422 sec]:58029.D# [Count] [Linear]





## Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

## Trace Metals Verification by ICP-MS (µg/mL)

|    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |
|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|
| Al | <0.02 | Cd | <0.02 | Dy | <0.02 | Hf | <0.02 | Li | <0.02 | Ni | <0.02 | Pr | <0.02 | Se | <0.2  | Tb | <0.02 | W  | <0.02 |
| Sb | <0.02 | Ca | <0.2  | Er | <0.02 | Ho | <0.02 | Lu | <0.02 | Nb | <0.02 | Re | <0.02 | Si | <0.02 | Te | <0.02 | U  | <0.02 |
| As | <0.2  | Ce | <0.02 | Bu | <0.02 | In | <0.02 | Mg | <0.01 | Os | <0.02 | Rh | <0.02 | Ag | <0.02 | Tl | <0.02 | V  | <0.02 |
| Ba | <0.02 | Cs | <0.02 | Gd | <0.02 | Ir | <0.02 | Mn | <0.02 | Pd | <0.02 | Rb | <0.02 | Na | <0.2  | Th | <0.02 | Yb | <0.02 |
| Be | <0.01 | Cr | <0.02 | Ga | <0.02 | Fe | <0.2  | Hg | <0.2  | P  | <0.02 | Ru | <0.02 | Sr | <0.02 | Tm | <0.02 | Y  | <0.02 |
| Bi | <0.02 | Co | <0.02 | Ge | <0.02 | La | <0.02 | Mo | <0.02 | Pt | <0.02 | Sm | <0.02 | S  | <0.02 | Sn | <0.02 | Zn | <0.02 |
| B  | <0.02 | Cu | T     | Au | <0.02 | Pb | <0.02 | Nd | <0.02 | K  | <0.2  | Sc | <0.02 | Ta | <0.02 | Ti | <0.02 | Zr | <0.02 |

(T) = Target analyte

## Physical Characterization:

Certified by:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
- \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- \* Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- \* All Standards should be stored with caps tight and under appropriate laboratory conditions.
- \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



**CERTIFIED WEIGHT REPORT:**

**Part Number:** 57004  
**Lot Number:** 102523  
**Description:** Beryllium (Be)

**Lot #** 24002546  
**Solvent:** Nitric Acid

**Expiration Date:**

102526

2.0%

40.0 (mL)

Nitric Acid

**Recommended Storage:**

Ambient (20 °C)

**Nominal Concentration (µg/mL):**

1000

**NIST Test Number:**

6UTB

**Volume shown below was diluted to (mL):** 2000.02

5E-05 Balance Uncertainty

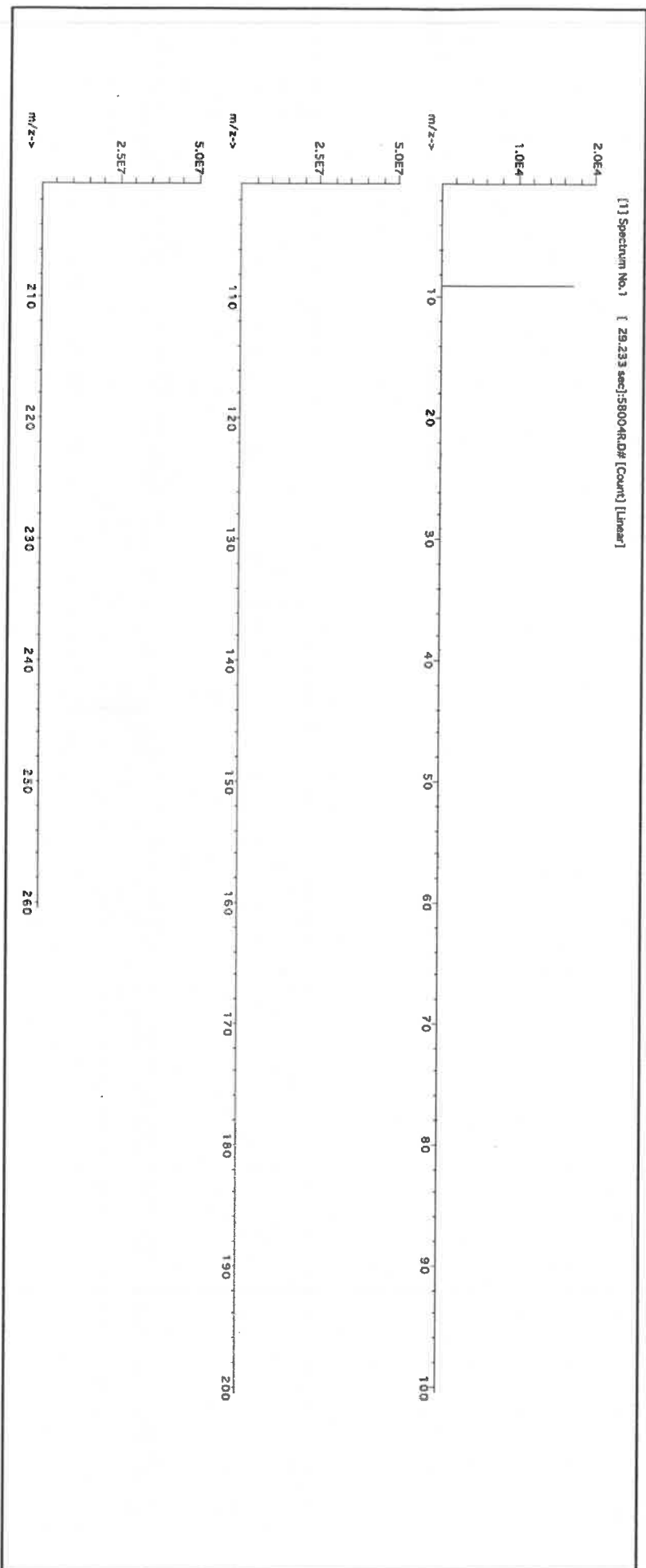
0.058 Flask Uncertainty

|                |                 |
|----------------|-----------------|
|                |                 |
| Formulated By: | Benson Chan     |
|                | 102523          |
|                |                 |
| Reviewed By:   | Pedro L. Rentas |
|                | 102523          |

**SDS Information**

| Compound | Part Number | Lot | Dilution Factor | Initial Vol. (mL) | Uncertainty Pipette (mL) | Nominal Conc. (µg/mL) | Initial Conc. (µg/mL) | Final Conc. (µg/mL) | Expanded Uncertainty +/- (µg/mL) | CAS# | OSHA PEL (TWA) | LD50 | NIST SRM |
|----------|-------------|-----|-----------------|-------------------|--------------------------|-----------------------|-----------------------|---------------------|----------------------------------|------|----------------|------|----------|
|----------|-------------|-----|-----------------|-------------------|--------------------------|-----------------------|-----------------------|---------------------|----------------------------------|------|----------------|------|----------|

|                           |       |        |        |       |       |      |         |        |     |            |          |                        |    |
|---------------------------|-------|--------|--------|-------|-------|------|---------|--------|-----|------------|----------|------------------------|----|
| 1. Beryllium nitrate (Be) | 58104 | 091423 | 0.1000 | 200.0 | 0.084 | 1000 | 10001.5 | 1000.0 | 2.2 | 13597-99-4 | 0.2µg/m3 | intrinsc-rat 3.16mg/kg | NA |
|---------------------------|-------|--------|--------|-------|-------|------|---------|--------|-----|------------|----------|------------------------|----|





## Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

Trace Metals Verification by ICP-MS ( $\mu\text{g/mL}$ )

|    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |
|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|
| Al | <0.02 | Cd | <0.02 | Dy | <0.02 | Hf | <0.02 | Li | <0.02 | Ni | <0.02 | Pt | <0.02 | Se | <0.2  | Tb | <0.02 | W  | <0.02 |
| Sb | <0.02 | Ca | <0.2  | Er | <0.02 | Ho | <0.02 | Lu | <0.02 | Nb | <0.02 | Re | <0.02 | Si | <0.02 | Tc | <0.02 | U  | <0.02 |
| As | <0.2  | Ce | <0.02 | Eu | <0.02 | In | <0.02 | Mg | <0.01 | Os | <0.02 | Rh | <0.02 | Ag | <0.02 | Ti | <0.02 | V  | <0.02 |
| Ba | <0.02 | Cs | <0.02 | Gd | <0.02 | Ir | <0.02 | Mn | <0.02 | Pd | <0.02 | Rb | <0.02 | Na | <0.2  | Th | <0.02 | Yb | <0.02 |
| Be | T     | Cr | <0.02 | Ga | <0.02 | Fe | <0.02 | Hg | <0.2  | P  | <0.2  | Ru | <0.02 | Sr | <0.02 | Tm | <0.02 | Y  | <0.02 |
| Bi | <0.02 | Co | <0.02 | Ge | <0.02 | La | <0.02 | Mo | <0.02 | Pt | <0.02 | Sm | <0.02 | S  | <0.02 | Sn | <0.02 | Zn | <0.02 |
| B  | <0.02 | Cu | <0.02 | Au | <0.02 | Pb | <0.02 | Nd | <0.02 | K  | <0.2  | Sc | <0.02 | Ta | <0.02 | Tl | <0.02 | Zr | <0.02 |

(T) = Target analyte

## Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

\* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.  
 \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.

\* All standard containers are meticulously cleaned prior to use.

\* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).

\* Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.

\* All Standards should be stored with caps tight and under appropriate laboratory conditions.

\* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



**Certified Reference Material CRM**



**CERTIFIED WEIGHT REPORT:**

**Part Number:** 57050  
**Lot Number:** 071123  
**Description:** Tin (Sn)

**Solvents:** 21110221 Nitric Acid  
22D0562008 Hydrochloric acid

*R-1.02509124*  
*M599*

**Expiration Date:** 071126  
**Recommended Storage:** Ambient (20 °C)  
**Nominal Concentration (µg/mL):** 1000  
**NIST Test Number:** 6UTB

Weight shown below was diluted to (mL):

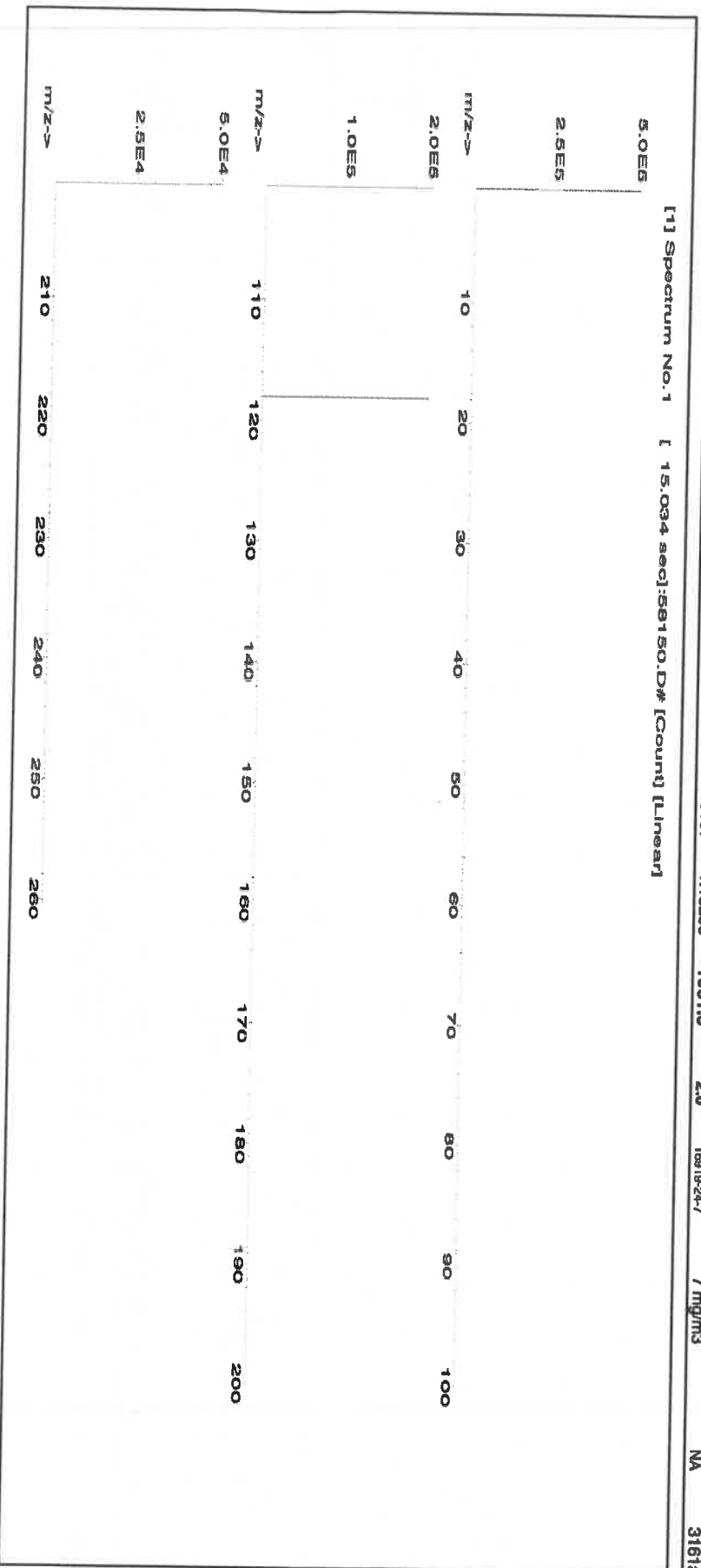
5E-05 Balance Uncertainty  
0.058 Flask Uncertainty

|                    |                    |
|--------------------|--------------------|
| <i>[Signature]</i> |                    |
| Formulated By:     | Benson Chan        |
|                    | 071123             |
| Reviewed By:       | <i>[Signature]</i> |
|                    | Pedro L. Rentas    |
|                    | 071123             |

| SDS Information                        |        |               |     |            |     |               |     |             |            |               |             |        |            |            |               |             |  |
|----------------------------------------|--------|---------------|-----|------------|-----|---------------|-----|-------------|------------|---------------|-------------|--------|------------|------------|---------------|-------------|--|
| Expanded                               |        |               |     |            |     |               |     |             |            |               |             |        |            |            |               |             |  |
| Uncertainty                            |        |               |     |            |     |               |     |             |            |               |             |        |            |            |               |             |  |
| (Solvent Safety Info. On Attached pg.) |        |               |     |            |     |               |     |             |            |               |             |        |            |            |               |             |  |
| NIST                                   |        |               |     |            |     |               |     |             |            |               |             |        |            |            |               |             |  |
| Compound                               |        | Lot           |     | Nominal    |     | Purity        |     | Uncertainty |            | Assay         |             | Target |            | Actual     |               | Actual      |  |
| RM#                                    | Number | Conc. (µg/mL) | (%) | Purity (%) | (%) | Deviation (%) | (%) | Weight (g)  | Weight (g) | Conc. (µg/mL) | +/- (µg/mL) | (%)    | Weight (g) | Weight (g) | Conc. (µg/mL) | +/- (µg/mL) |  |

1. Ammonium hexafluoroantimonate(V) (Sn) IN010 SMD042023A1 1000 99.999 0.10 44.2 1.13107 1.13286 1001.6 2.0 16919-24-7 7 mg/m3 NA 3161a

[1] Spectrum No. 1 [ 15.034 sec]:56150.D# [Count] [Linear]





**Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):**

**Trace Metals Verification by ICP-MS (µg/mL)**

|    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |
|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|
| Al | <0.02 | Cd | <0.02 | Dy | <0.02 | Hf | <0.02 | Li | <0.02 | Ni | <0.02 | Pr | <0.02 | Se | <0.2  | Tb | <0.02 | W  | <0.02 |
| Sb | <0.02 | Ca | <0.2  | Er | <0.02 | Ho | <0.02 | Lu | <0.02 | Nb | <0.02 | Re | <0.02 | Si | <0.02 | Te | <0.02 | U  | <0.02 |
| As | <0.2  | Ce | <0.02 | Eu | <0.02 | In | <0.02 | Mg | <0.01 | Os | <0.02 | Rh | <0.02 | Ag | <0.02 | Ti | <0.02 | V  | <0.02 |
| Ba | <0.02 | Cs | <0.02 | Gd | <0.02 | Ir | <0.02 | Mn | <0.02 | Pd | <0.02 | Rb | <0.02 | Na | <500  | Th | <0.02 | Yb | <0.02 |
| Be | <0.01 | Cr | <0.02 | Ga | <0.02 | Fe | <0.2  | Hg | <0.2  | P  | <0.02 | Ru | <0.02 | Sr | <0.02 | Tm | <0.02 | Y  | <0.02 |
| Bi | <0.02 | Co | <0.02 | Ge | <0.02 | La | <0.02 | Mo | <0.02 | Pt | <0.02 | Sm | <0.02 | S  | <0.02 | Ta | <0.02 | Zn | <0.02 |
| B  | <0.02 | Cu | <0.02 | Au | <0.02 | Pb | <0.02 | Nd | <0.02 | K  | <0.2  | Sc | <0.02 | Ta | <0.02 | Ti | <0.02 | Zr | <0.02 |

(T) = Target analyte

**Physical Characterization:**

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
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- \* Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- \* All standards should be stored with caps tight and under appropriate laboratory conditions.
- \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).





R: 02/09/24 115800 (54)

CERTIFIED WEIGHT REPORT:

Part Number: 57027  
Lot Number: 091923  
Description: Cobalt (Co)

Expiration Date: 091926  
Recommended Storage: Ambient (20 °C)  
Nominal Concentration (µg/mL): 1000  
NIST Test Number: 6UTB

Volume shown below was diluted to (mL): 2000.02

5E-05 Balance Uncertainty  
0.058 Flask Uncertainty

Lot # 24002546  
Solvent: Nitric Acid

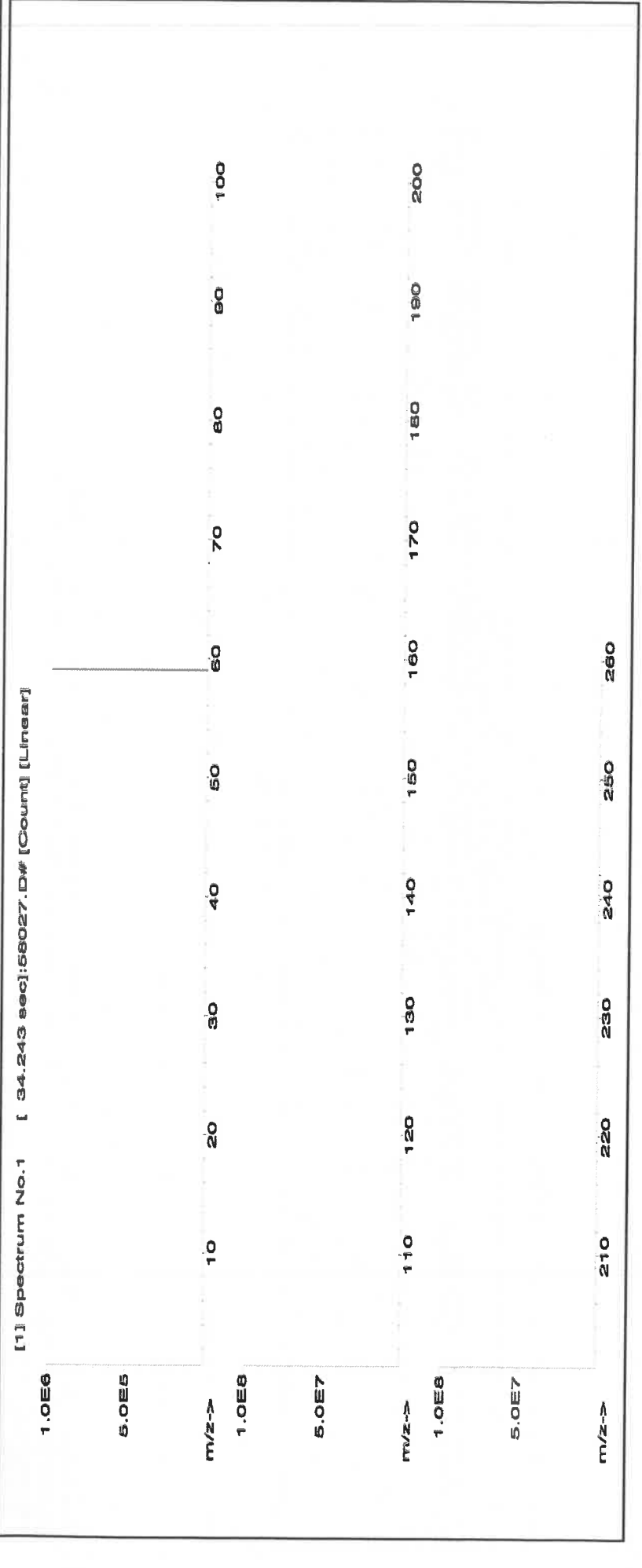
2.0% Nitric Acid  
40.0 (mL)

|                |                 |
|----------------|-----------------|
|                |                 |
| Formulated By: | Lawrence Barry  |
|                |                 |
| Reviewed By:   | Pedro L. Rentas |

SDS Information

Expanded Uncertainty +/- (µg/mL)  
(Solvent Safety Info. On Attached pg.)  
NIST SRM  
CAS# OSHA PEL (TWA) LD50

1. Cobalt(II) nitrate hexahydrate (Co) 58127 050923 0.1000 200.0 0.084 1000 10000.0 1000.0 2.2 10026-22-9 0.02 mg/m3 orl-rat 691 mg/kg 3113





Instrumental Analysis by Inductively Coupled Plasma Mass Spectroscopy (ICP-MS):

Trace Metals Verification by ICP-MS ( $\mu\text{g/mL}$ )

|    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |
|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|
| Al | <0.02 | Cd | <0.02 | Dy | <0.02 | Hf | <0.02 | Li | <0.02 | Ni | <0.02 | Pr | <0.02 | Se | <0.2  | Tb | <0.02 | W  | <0.02 |
| Sb | <0.02 | Ca | <0.2  | Er | <0.02 | Ho | <0.02 | Lu | <0.02 | Nb | <0.02 | Re | <0.02 | Si | <0.02 | Te | <0.02 | U  | <0.02 |
| As | <0.2  | Ce | <0.02 | Eu | <0.02 | In | <0.02 | Mg | <0.02 | Os | <0.01 | Rh | <0.02 | Ag | <0.02 | Tl | <0.02 | V  | <0.02 |
| Ba | <0.02 | Cs | <0.02 | Gd | <0.02 | Ir | <0.02 | Mn | <0.02 | Pd | <0.02 | Rb | <0.2  | Na | <0.02 | Th | <0.02 | Yb | <0.02 |
| Be | <0.01 | Cr | <0.02 | Ga | <0.02 | Fe | <0.2  | Hg | <0.2  | P  | <0.02 | Ru | <0.02 | Sr | <0.02 | Tm | <0.02 | Y  | <0.02 |
| Bi | <0.02 | Co | T     | Ge | <0.02 | La | <0.02 | Mo | <0.02 | Pt | <0.02 | Sm | <0.02 | S  | <0.02 | Sn | <0.02 | Zn | <0.02 |
| B  | <0.02 | Cu | <0.02 | Au | <0.02 | Pb | <0.02 | Nd | <0.02 | K  | <0.2  | Sc | <0.2  | Ta | <0.02 | Ti | <0.02 | Zr | <0.02 |

(T)= Target analyte

Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
- \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- \* Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- \* All standards should be stored with caps tight and under appropriate laboratory conditions.
- \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



**CERTIFIED WEIGHT REPORT:**

**Part Number:**  
**Lot Number:**  
**Description:**

**57033**  
**111323**  
**Arsenic (As)**

**Lot #**  
**Solvent:**

**24002546**  
**Nitric Acid**

**Expiration Date:**

**111326**

**2.0%**  
**80.0 (mL)**

**Nitric Acid**

**Recommended Storage:**

**Ambient (20 °C)**

**Nominal Concentration (µg/mL):**

**1000**

**NIST Test Number:**

**6UTB**

**Volume shown below was diluted to (mL):**

**4000.0**

**5E-05 Balance Uncertainty**  
**0.06 Flask Uncertainty**

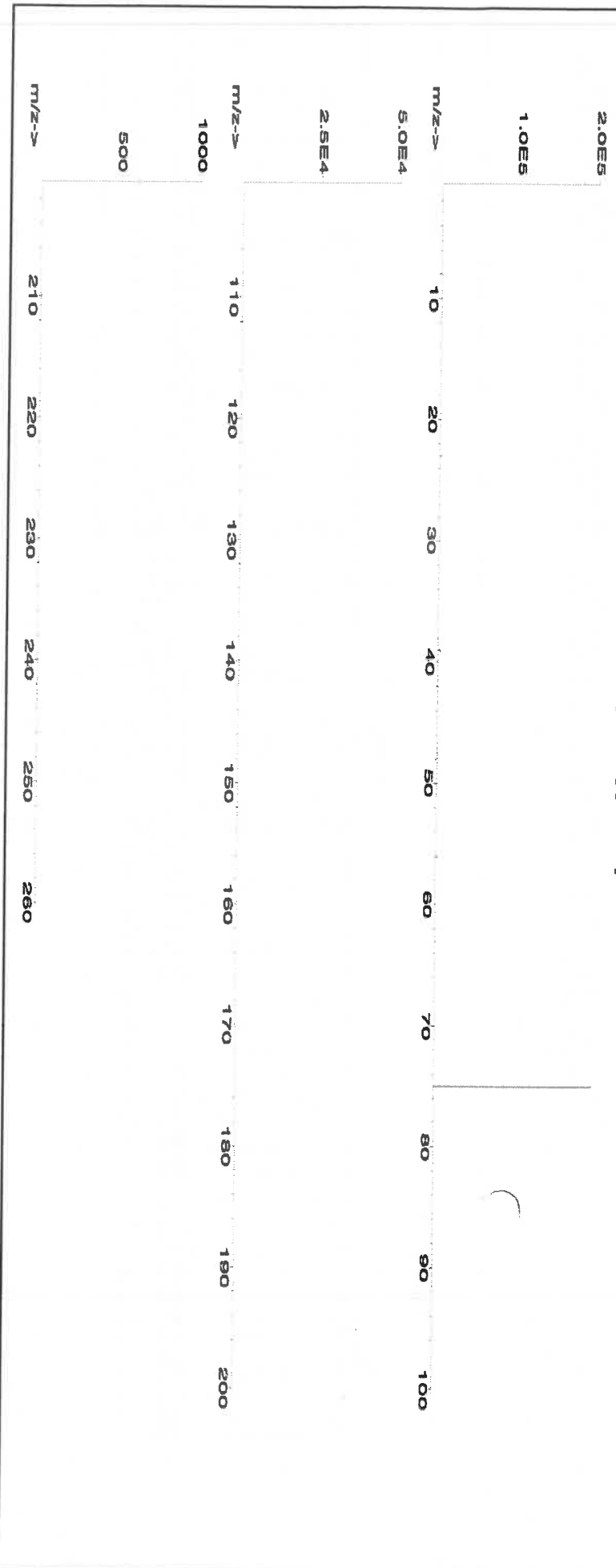
|                |                 |
|----------------|-----------------|
|                |                 |
| Formulated By: | Lawrence Barry  |
|                | 111323          |
|                |                 |
| Reviewed By:   | Pedro L. Rendas |
|                | 111323          |

**Compound**

| Part Number | Lot Number | Dilution Factor | Initial Vol. (mL) | Uncertainty Pipette (mL) | Nominal Conc. (µg/mL) | Initial Conc. (µg/mL) | Final Conc. (µg/mL) | Expanded Uncertainty +/- (µg/mL) | SDS Information (Solvent Safety Info. On Attached pg.) | CAS# | OSHA PEL (TWA) | LD50 | NIST SRM |
|-------------|------------|-----------------|-------------------|--------------------------|-----------------------|-----------------------|---------------------|----------------------------------|--------------------------------------------------------|------|----------------|------|----------|
|-------------|------------|-----------------|-------------------|--------------------------|-----------------------|-----------------------|---------------------|----------------------------------|--------------------------------------------------------|------|----------------|------|----------|

|                 |       |        |        |       |       |      |         |        |     |           |           |                  |       |
|-----------------|-------|--------|--------|-------|-------|------|---------|--------|-----|-----------|-----------|------------------|-------|
| 1. Arsenic (As) | 58133 | 020522 | 0.1000 | 400.0 | 0.084 | 1000 | 10001.0 | 1000.0 | 2.0 | 7440-38-2 | 0.5 mg/m3 | or-rat 500 mg/kg | 3103a |
|-----------------|-------|--------|--------|-------|-------|------|---------|--------|-----|-----------|-----------|------------------|-------|

[1] Spectrum No.1 [34.433 sec]:57033.D# [Count] [Linear]





**Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):**

**Trace Metals Verification by ICP-MS (µg/mL)**

|    |       |    |       |     |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |
|----|-------|----|-------|-----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|
| Al | <0.02 | Cd | <0.02 | Dy  | <0.02 | Hf | <0.02 | Li | <0.02 | Ni | <0.02 | Pr | <0.02 | Se | <0.2  | Tb | <0.02 | W  | <0.02 |
| Sb | <0.02 | Ca | <0.2  | Er  | <0.02 | Ho | <0.02 | Lu | <0.02 | Nb | <0.02 | Re | <0.02 | Si | <0.02 | Te | <0.02 | U  | <0.02 |
| As | T     | Ce | <0.02 | Eu  | <0.02 | In | <0.02 | Mg | <0.01 | Os | <0.02 | Rh | <0.02 | Ag | <0.02 | Tl | <0.02 | V  | <0.02 |
| Ba | <0.02 | Cs | <0.02 | Gd  | <0.02 | Ir | <0.02 | Mn | <0.02 | Pd | <0.02 | Rb | <0.02 | Na | <0.2  | Tl | <0.02 | Yb | <0.02 |
| Be | <0.01 | Cr | <0.02 | Ga  | <0.02 | Fe | <0.2  | Hg | <0.2  | P  | <0.02 | Ru | <0.02 | Sr | <0.02 | Tm | <0.02 | Y  | <0.02 |
| Bi | <0.02 | Co | <0.02 | Ge* | <0.02 | La | <0.02 | Mo | <0.02 | Pt | <0.02 | Sm | <0.02 | S  | <0.02 | Su | <0.02 | Zn | <0.02 |
| B  | <0.02 | Cu | <0.02 | Au  | <0.02 | Pb | <0.02 | Nd | <0.02 | K  | <0.2  | Sc | <0.02 | Ta | <0.02 | Ti | <0.02 | Zr | <0.02 |

(T) = Target analyte

**Physical Characterization:**

Homogeneity: No heterogeneity was observed in the preparation of this standard.

**Certified by:**

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
- \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- \* Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- \* All standards should be stored with caps tight and under appropriate laboratory conditions.
- \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



**CERTIFIED WEIGHT REPORT:**

**Part Number:** 57115  
**Lot Number:** 041723  
**Description:** Phosphorous (P)

**Solvent:** 21110221 Nitric Acid

**Lot #**

R102109124 M5815

**Expiration Date:** 041726  
**Recommended Storage:** Ambient (20 °C)  
**Nominal Concentration (µg/mL):** 10000  
**NIST Test Number:** 6UTB

**2% 40.0 (mL) Nitric Acid**

**Weight shown below was diluted to (mL):** 2000.02 0.056 Balance Uncertainty Flask Uncertainty

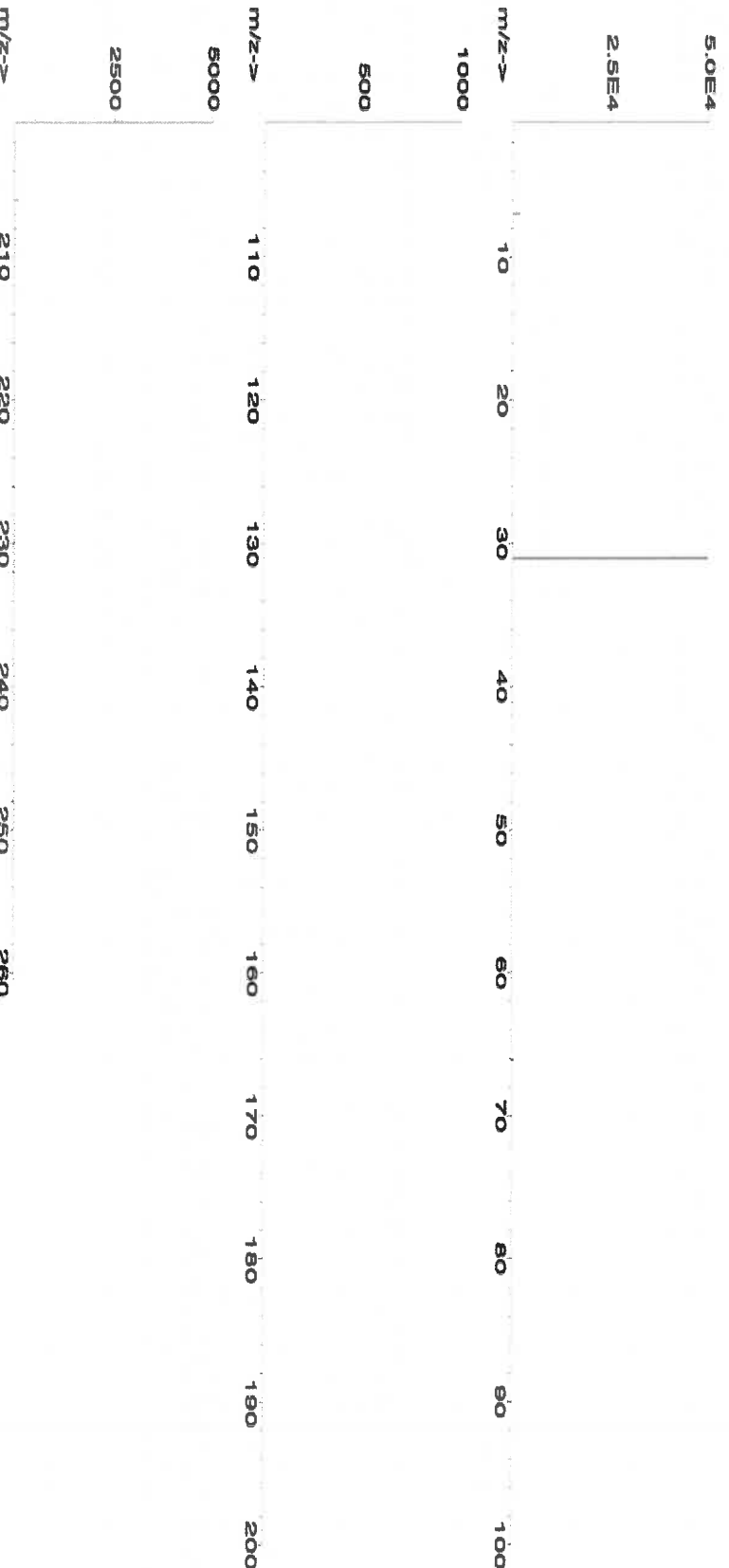
|                                      |               |
|--------------------------------------|---------------|
|                                      |               |
| <b>Formulated By:</b> Lawrence Barry | <b>041723</b> |
|                                      |               |
| <b>Reviewed By:</b> Pedro L. Rentas  | <b>041723</b> |

**Compound**

| RM# | Lot Number | Nominal Conc. (µg/mL) | Purity (%) | Uncertainty Purity (%) | Assay (%) | Target Weight (g) | Actual Weight (g) | Actual Conc. (µg/mL) | Expanded Uncertainty +/- (µg/mL) | CAS# | OSHA PEL (TWA) | LD50 | NIST SRM |
|-----|------------|-----------------------|------------|------------------------|-----------|-------------------|-------------------|----------------------|----------------------------------|------|----------------|------|----------|
|-----|------------|-----------------------|------------|------------------------|-----------|-------------------|-------------------|----------------------|----------------------------------|------|----------------|------|----------|

1. Ammonium dihydrogen phosphate (P) IN008 PVR2019A1 10000 99.999 0.10 27.5 72.7287 72.7289 10000.0 20.0 7722-76-1 5 mg/m3 or-hal >2000mg/kg 3186

[1] Spectrum No.1 [ 12.074 sec]:58115.D# [Count] [Linear]





**Instrumental Analysis by Inductively Coupled Plasma Mass Spectroscopy (ICP-MS):**

**Trace Metals Verification by ICP-MS (µg/mL)**

|    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |
|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|
| Al | <0.02 | Cd | <0.02 | Dy | <0.02 | Hf | <0.02 | Li | <0.02 | Ni | <0.02 | Pt | <0.02 | Se | <0.2  | Tb | <0.02 | W  | <0.02 |
| Sb | <0.02 | Ca | <0.2  | Er | <0.02 | Ho | <0.02 | Lu | <0.02 | Nb | <0.02 | Re | <0.02 | Si | <0.02 | Te | <0.02 | U  | <0.02 |
| As | <0.2  | Ce | <0.02 | Eu | <0.02 | In | <0.02 | Mg | <0.01 | Os | <0.02 | Rh | <0.02 | Ag | <0.02 | Tl | <0.02 | V  | <0.02 |
| Ba | <0.02 | Cs | <0.02 | Gd | <0.02 | Ir | <0.02 | Mn | <0.02 | Pd | <0.02 | Rb | <0.02 | Na | <0.2  | Th | <0.02 | Yb | <0.02 |
| Be | <0.01 | Cr | <0.02 | Ga | <0.02 | Fe | <0.2  | Hg | <0.2  | P  | T     | Ru | <0.02 | Sr | <0.02 | Tm | <0.02 | Y  | <0.02 |
| Bi | <0.02 | Co | <0.02 | Ge | <0.02 | La | <0.02 | Mo | <0.02 | Pt | <0.02 | Sm | <0.02 | S  | <0.02 | Sn | <0.02 | Zn | <0.02 |
| B  | <0.02 | Cu | <0.02 | Au | <0.02 | Pb | <0.02 | Nd | <0.02 | K  | <0.2  | Sc | <0.02 | Ta | <0.02 | Ti | <0.02 | Zr | <0.02 |

(T) = Target analyte

**Physical Characterization:**

Homogeneity: No heterogeneity was observed in the preparation of this standard.

**Certified by:**

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
- \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- \* Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- \* All Standards should be stored with caps tight and under appropriate laboratory conditions.
- \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



**CERTIFIED WEIGHT REPORT:**

Part Number: **57116**  
Lot Number: **071123**  
Description: **Sulfur (S)**

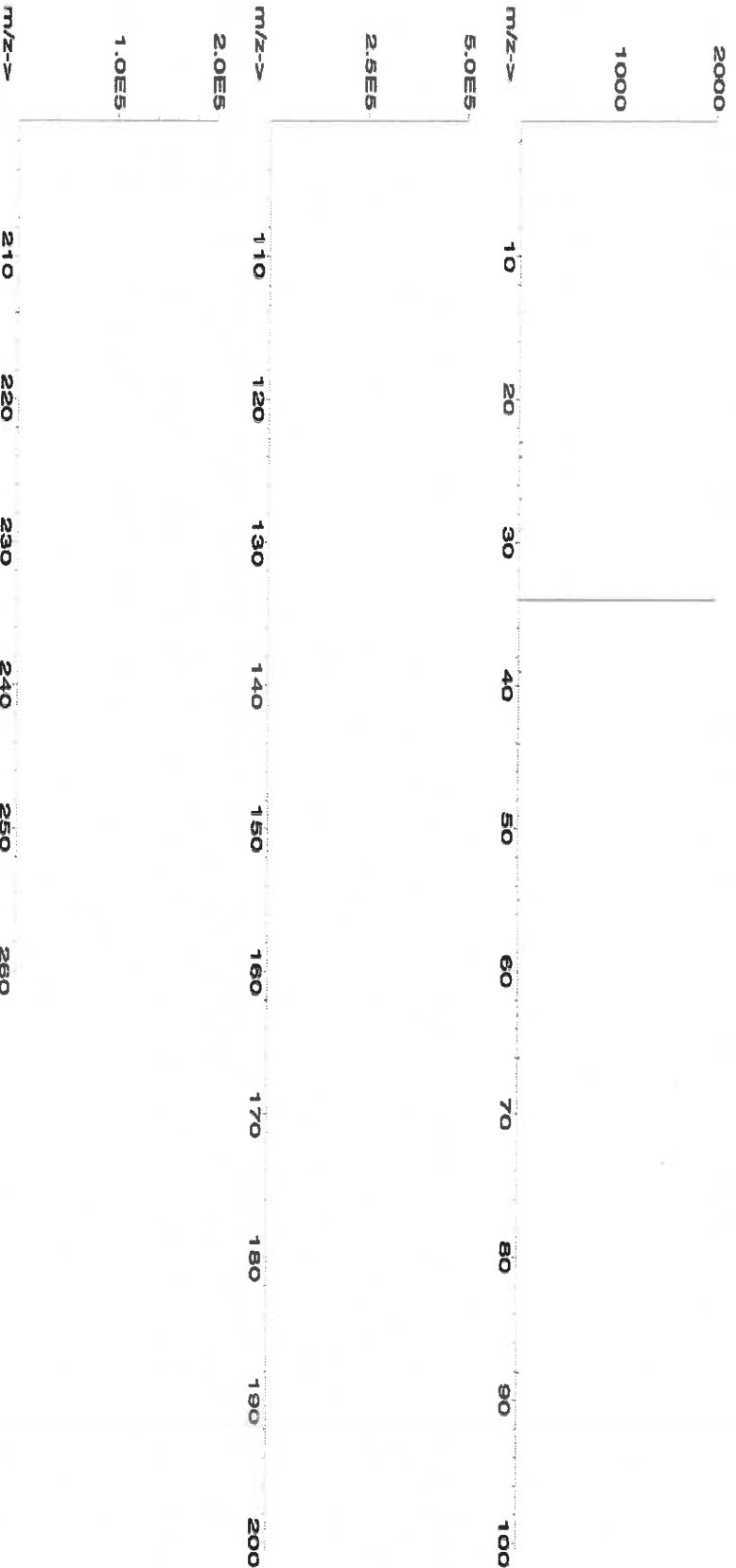
Lot #  
Solvent: 071123  
ASTM Type 1 Water

|                 |                |
|-----------------|----------------|
|                 |                |
| Formulated By:  | Lawrence Barry |
| Reviewed By:    |                |
| Pedro L. Rentas |                |
| 071123          |                |

Expiration Date: 071126  
Recommended Storage: Ambient (20 °C)  
Nominal Concentration (µg/mL): 10000  
NIST Test Number: 6UTB  
Weight shown below was diluted to (mL): 1999.48  
5E-05 Balance Uncertainty  
0.058 Flask Uncertainty

| SDS Information      |                |                       |            |                        |           |                   |                   |                      |                                  |
|----------------------|----------------|-----------------------|------------|------------------------|-----------|-------------------|-------------------|----------------------|----------------------------------|
| Compound             | Lot Number     | Nominal Conc. (µg/mL) | Purity (%) | Uncertainty Purity (%) | Assay (%) | Target Weight (g) | Actual Weight (g) | Actual Conc. (µg/mL) | Expanded Uncertainty +/- (µg/mL) |
| Ammonium sulfate (S) | IN117 SLBR725V | 10000                 | 99.9       | 0.10                   | 24.3      | 82.4675           | 82.4692           | 10000.1              | 20.0                             |
|                      |                |                       |            |                        |           | 7763-20-2         | NA                |                      |                                  |
|                      |                |                       |            |                        |           |                   | oral 4250mg/kg    | 3181                 |                                  |

[1] Spectrum No. 1 [ 24.004 sec]:58116.D# [Count] [Linear]





**Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):**

**Trace Metals Verification by ICP-MS (µg/mL)**

|    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |
|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|
| Al | <0.02 | Cd | <0.02 | Dy | <0.02 | Hf | <0.02 | Li | <0.02 | Ni | <0.02 | Pt | <0.02 | Se | <0.2  | Tb | <0.02 | W  | <0.02 |
| Sb | <0.02 | Ca | <0.2  | Er | <0.02 | Ho | <0.02 | Lu | <0.02 | Nb | <0.02 | Re | <0.02 | Si | <0.02 | Te | <0.02 | U  | <0.02 |
| As | <0.2  | Ce | <0.02 | Eu | <0.02 | In | <0.02 | Mg | <0.01 | Os | <0.02 | Rh | <0.02 | Ag | <0.02 | Tl | <0.02 | V  | <0.02 |
| Ba | <0.02 | Cs | <0.02 | Gd | <0.02 | Ir | <0.02 | Mn | <0.02 | Pd | <0.02 | Rb | <0.02 | Na | <0.2  | Ti | <0.02 | Yb | <0.02 |
| Be | <0.01 | Cr | <0.02 | Ga | <0.02 | Fe | <0.2  | Hg | <0.2  | P  | <0.02 | Ru | <0.02 | Sr | <0.02 | Tm | <0.02 | Y  | <0.02 |
| Bi | <0.02 | Co | <0.02 | Ge | <0.02 | La | <0.02 | Mo | <0.02 | Pt | <0.02 | Sm | <0.02 | S  | T     | Sn | <0.02 | Zn | <0.02 |
| B  | <0.02 | Cu | <0.02 | Au | <0.02 | Pb | <0.02 | Nd | <0.02 | K  | <0.2  | Sc | <0.02 | Ta | <0.02 | Ti | <0.02 | Zr | <0.02 |

**Physical Characterization:**

(T)= Target analyte

Certified by:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
- \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- \* Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- \* All standards should be stored with caps tight and under appropriate laboratory conditions.
- \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).





**CERTIFIED WEIGHT REPORT:**

**Part Number:** 58030  
**Lot Number:** 111623  
**Description:** Zinc (Zn)

**Solvent:** 24002546 Nitric Acid

**Lot #** R: 02109124 MS819

**2%** 60.0 (mL) Nitric Acid

**Expiration Date:** 111626

**Recommended Storage:** Ambient (20 °C)

**Nominal Concentration (µg/mL):** 1000

**NIST Test Number:** 6UTB

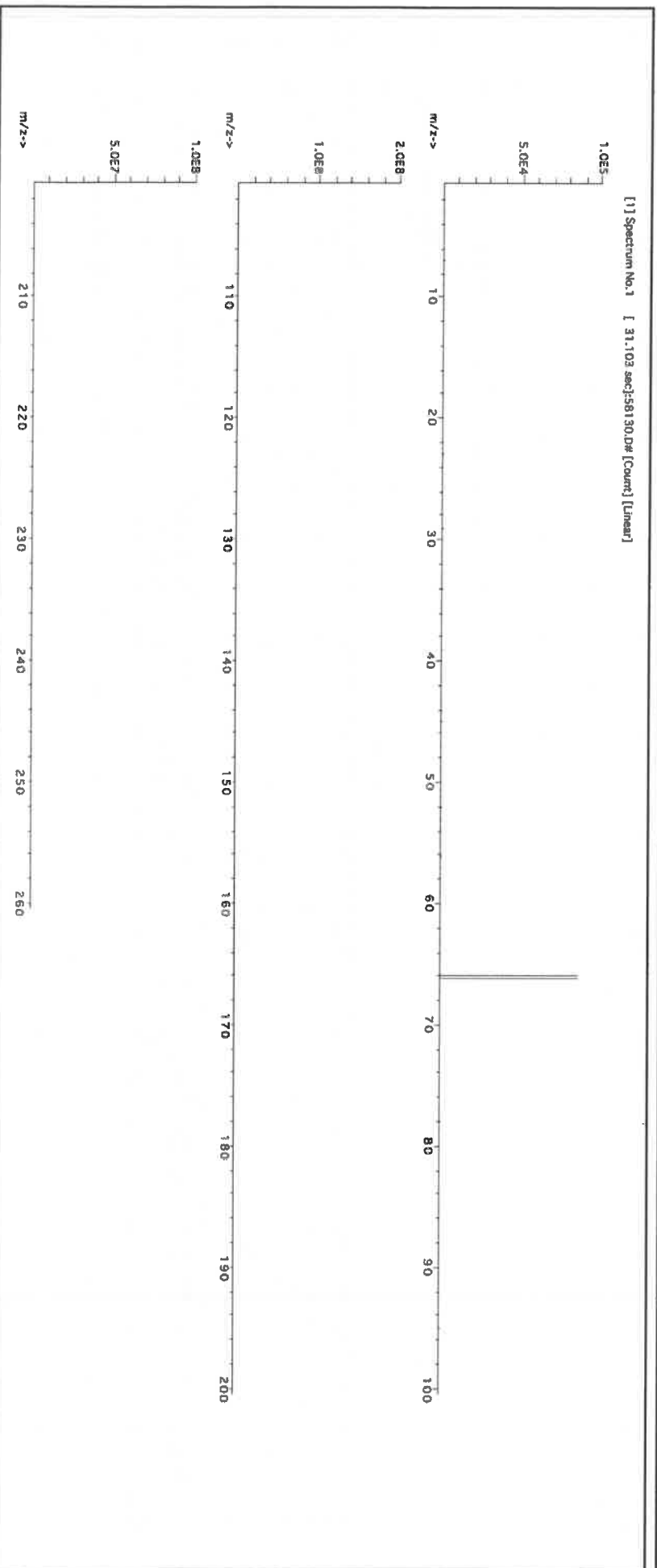
**Weight shown below was diluted to (mL):** 3000.4

|                |                  |        |
|----------------|------------------|--------|
| Formulated By: | Benson Chan      | 111623 |
| Reviewed By:   | Pedro L. Rientas | 111623 |

**Compound**

| RM# | Lot Number | Nominal Conc. (µg/mL) | Purity (%) | Uncertainty Purity (%) | Assay (%) | Target Weight (g) | Actual Weight (g) | Actual Conc. (µg/mL) | Expanded Uncertainty +/- (µg/mL) | CAS# | OSHA PEL (TWA) | LDSO | NIST SRM |
|-----|------------|-----------------------|------------|------------------------|-----------|-------------------|-------------------|----------------------|----------------------------------|------|----------------|------|----------|
|-----|------------|-----------------------|------------|------------------------|-----------|-------------------|-------------------|----------------------|----------------------------------|------|----------------|------|----------|

1. Zinc nitrate hexahydrate (Zn) IN016 ZNE03021A1 1000 99.999 0.10 24.3 12.3475 12.3502 1000.2 2.0 10196-16-6 1 mg/mL 3168 on-rat 1190mg/kg





**Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):**

**Trace Metals Verification by ICP-MS (µg/mL)**

|    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |
|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|
| Al | <0.02 | Cd | <0.02 | Dy | <0.02 | Hf | <0.02 | Li | <0.02 | Ni | <0.02 | Pr | <0.02 | Se | <0.2  | Tb | <0.02 | W  | <0.02 |
| Sb | <0.02 | Ca | <0.2  | Er | <0.02 | Ho | <0.02 | Lu | <0.02 | Nb | <0.02 | Re | <0.02 | Si | <0.02 | Te | <0.02 | U  | <0.02 |
| As | <0.2  | Ce | <0.02 | Bu | <0.02 | In | <0.02 | Mg | <0.01 | Os | <0.02 | Rh | <0.02 | Ag | <0.02 | Tl | <0.02 | V  | <0.02 |
| Ba | <0.02 | Cs | <0.02 | Gd | <0.02 | Ir | <0.02 | Mn | <0.02 | Pd | <0.02 | Rb | <0.02 | Na | <0.2  | Th | <0.02 | Yb | <0.02 |
| Be | <0.01 | Cr | <0.02 | Ga | <0.02 | Fe | <0.2  | Hg | <0.2  | P  | <0.02 | Ru | <0.02 | Sr | <0.02 | Tm | <0.02 | Y  | <0.02 |
| Bi | <0.02 | Co | <0.02 | Ge | <0.02 | La | <0.02 | Mo | <0.02 | Pt | <0.02 | Sm | <0.02 | S  | <0.02 | Sn | <0.02 | Zn | <0.02 |
| B  | <0.02 | Cu | <0.02 | Au | <0.02 | Pb | <0.02 | Nd | <0.02 | K  | <0.2  | Sc | <0.02 | Ta | <0.02 | Ti | <0.02 | Zr | <0.02 |

(T) = Target analyte

**Physical Characterization:**

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
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- \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

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Christiansburg, VA 24073 USA  
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F: 540-585-3012  
info@inorganicventures.com

R: 02/22/24 M.5942

## 1.0 ACCREDITATION / REGISTRATION

**INORGANIC VENTURES** is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



## 2.0 PRODUCT DESCRIPTION

Product Code: Single Analyte Custom Grade Solution  
Catalog Number: CGT11  
Lot Number: T2-TI719972  
Matrix: 2% (v/v) HNO<sub>3</sub>  
tr. HF  
Value / Analyte(s): 1 000 µg/mL ea:  
Titanium  
Starting Material: Ti Metal  
Starting Material Lot#: 2094  
Starting Material Purity: 99.9975%

## 3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Value: 1002 ± 5 µg/mL  
Density: 1.012 g/mL (measured at 20 ± 4 °C)

### Assay Information:

Assay Method #1 1002 ± 4 µg/mL  
ICP Assay NIST SRM 3162a Lot Number: 130925

- The Calculated Value is a value calculated from the weight of a starting material that has been certified directly vs. a National Institute of Standards and Technology (NIST) SRM/RM. See Sec 4.2 for balance traceability.

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

### Characterization of CRM/RM by Two or More Methods

Certified Value,  $X_{CRM/RM}$ , where two or more methods of characterization are used is the weighted mean of the results:

$$X_{CRM/RM} = \sum (w_i) (X_i)$$

$X_i$  = mean of Assay Method i with standard uncertainty  $u_{char i}$

$w_i$  = the weighting factors for each method calculated using the inverse square of the variance:

$$w_i = (1/u_{char i}^2) / (\sum (1/u_{char i}^2))$$

$$CRM/RM \text{ Expanded Uncertainty } (z) = U_{CRM/RM} = k (u_{char}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$$

k = coverage factor = 2

$u_{char} = [\sum (w_i)^2 (u_{char i}^2)]^{1/2}$  where  $u_{char i}$  are the errors from each characterization method

$u_{bb}$  = bottle to bottle homogeneity standard uncertainty

$u_{lts}$  = long term stability standard uncertainty (storage)

$u_{ts}$  = transport stability standard uncertainty

### Characterization of CRM/RM by One Method

Certified Value,  $X_{CRM/RM}$ , where one method of characterization is used is the mean of individual results:

$$X_{CRM/RM} = (X_a) (u_{char a})$$

$X_a$  = mean of Assay Method A with

$u_{char a}$  = the standard uncertainty of characterization Method A

$$CRM/RM \text{ Expanded Uncertainty } (z) = U_{CRM/RM} = k (u_{char a}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$$

k = coverage factor = 2

$u_{char a}$  = the errors from characterization

$u_{bb}$  = bottle to bottle homogeneity standard uncertainty

$u_{lts}$  = long term stability standard uncertainty (storage)

$u_{ts}$  = transport stability standard uncertainty

## 4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

### 4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

### 4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

### 4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

## 5.0 TRACE METALLIC IMPURITIES (TMI ) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

CRM/RMs are tested for trace metallic impurities by Axial ICP-OES and ICP-MS. The result from the most sensitive method for each element, is reported below. Solutions tested by ICP-MS were analyzed in an ULPA-Filtered Clean Room. An ULPA-Filter is 99.9985% efficient for the removal of particles down to 0.3 µm.

|   |    |   |          |   |    |   |          |   |    |   |          |   |    |   |          |   |    |   |          |
|---|----|---|----------|---|----|---|----------|---|----|---|----------|---|----|---|----------|---|----|---|----------|
| M | Ag | < | 0.000536 | M | Eu | < | 0.000268 | O | Na | < | 0.032670 | M | Se |   | 0.001204 | O | Zn | < | 0.003267 |
| O | Al |   | 0.000872 | O | Fe |   | 0.003225 | O | Nb | < | 0.043560 | O | Si |   | 0.004735 | O | Zr | < | 0.043560 |
| M | As | < | 0.008586 | M | Ga | < | 0.000268 | M | Nd | < | 0.000268 | M | Sm | < | 0.000268 |   |    |   |          |
| M | Au | < | 0.004577 | M | Gd | < | 0.000268 | O | Ni | < | 0.010890 | M | Sn |   | 0.000096 |   |    |   |          |
| O | B  | < | 0.008929 | M | Ge | < | 0.002146 | M | Os | < | 0.000269 | O | Sr |   | 0.000096 |   |    |   |          |
| M | Ba | < | 0.002683 | M | Hf |   | 0.002161 | O | P  | < | 0.054450 | M | Ta |   | 0.010560 |   |    |   |          |
| M | Be | < | 0.005366 | M | Hg | < | 0.003231 | M | Pb | < | 0.001073 | M | Tb | < | 0.000268 |   |    |   |          |
| M | Bi | < | 0.001609 | M | Ho | < | 0.000268 | M | Pd | < | 0.000268 | M | Te | < | 0.001341 |   |    |   |          |
| O | Ca |   | 0.000676 | M | In | < | 0.002683 | M | Pr | < | 0.000268 | M | Th | < | 0.053663 |   |    |   |          |
| M | Cd | < | 0.000268 | M | Ir | < | 0.000269 | M | Pt | < | 0.000536 | s | Ti | < |          |   |    |   |          |
| M | Ce | < | 0.000268 | M | K  |   | 0.001172 | M | Rb | < | 0.000268 | M | Tl | < | 0.000268 |   |    |   |          |
| M | Co | < | 0.004293 | M | La | < | 0.000268 | M | Re | < | 0.000268 | M | Tm | < | 0.000268 |   |    |   |          |
| M | Cr |   | 0.000752 | O | Li | < | 0.027225 | M | Rh | < | 0.000268 | M | U  | < | 0.000268 |   |    |   |          |
| M | Cs | < | 0.000268 | M | Lu | < | 0.000268 | M | Ru | < | 0.000269 | M | V  | < | 0.019855 |   |    |   |          |
| O | Cu | < | 0.010890 | O | Mg | < | 0.005445 | i | S  | < |          | M | W  |   | 0.000473 |   |    |   |          |
| M | Dy | < | 0.000268 | O | Mn | < | 0.003267 | M | Sb | < | 0.006976 | M | Y  | < | 0.002146 |   |    |   |          |
| M | Er | < | 0.000268 | M | Mo |   | 0.000774 | O | Sc | < | 0.004900 | M | Yb | < | 0.000536 |   |    |   |          |

M - Checked by ICP-MS    O - Checked by ICP-OES    i - Spectral Interference  
n - Not Checked For    s - Solution Standard Element

## 6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

## 7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

### 7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit [www.inorganicventures.com/TCT](http://www.inorganicventures.com/TCT)

**Atomic Weight; Valence; Coordination Number; Chemical Form in Solution** - 47.87 +4 6 Ti(F)6-2

**Chemical Compatibility** - Soluble in concentrated HCl, HF, H3PO4 H2SO4 and HNO3. Avoid neutral to basic media. Unstable at ppm levels with metals that would pull F- away (i.e. Do not mix with Alkaline or Rare Earths or high levels of transition elements unless they are fluorinated). Stable with most inorganic anions with a tendency to hydrolyze forming the hydrated oxide in all dilute acids except HF.

**Stability** - 2-100 ppb levels stable (Alone or mixed with all other metals) as the Ti(F)6-2 for months in 1% HNO3 / LDPE container. 1-10,000 ppm single element solutions as the Ti(F)6-2 chemically stable for years in 2-5% HNO3 / trace HF in an LDPE container.

**Ti Containing Samples (Preparation and Solution)** - Metal (Soluble in H2O / HF caution -powder reacts violently); Oxide - low temperature history anatase or rutile (Dissolved by heating in 1:1:1 H2O / HF / H2SO4); Oxide - high temperature history (~800EC) brookite (fuse in Pt0 with K2S2O7); Ores ( fuse in Pt0 with KF + K2S2O7 - no KF if silica not present); Organic Matrices (Dry ash at 450EC in Pt0 and dissolve by heating with 1:1:1 H2O / HF / H2SO4 or fuse ash with pyrosulfate if oxide is as plastic pigment and likely in brookite crystalline form).

**Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/axial view):**

| Technique/Line     | Estimated D.L.          | Order | Interferences (underlined indicates severe)                                                      |
|--------------------|-------------------------|-------|--------------------------------------------------------------------------------------------------|
| ICP-MS 48 amu      | 14 ppt                  | N/A   | 32S16O, 32S14N,<br>14N16O18O,<br>14N17N2, 36Ar12C,<br>48Ca, [96X=2<br>(where X = Zr, Mo,<br>Ru)] |
| ICP-OES 323.452 nm | 0.0054 / 0.00092 µg/mL  | 1     | Ce, Ar, Ni                                                                                       |
| ICP-OES 334.941 nm | 0.0038 / 0.000028 µg/mL | 1     | Nb, Ta, Cr, U                                                                                    |
| ICP-OES 336.121 nm | 0.0053 / 0.000034 µg/mL | 1     | W, Mo, Co                                                                                        |

**HF Note:** This standard should not be prepared or stored in glass.

## 8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

## 9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

## 10.0 QUALITY STANDARD DOCUMENTATION

### 10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

### 10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

### 10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

## 11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

### 11.1 Certification Issue Date

June 17, 2022

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

### 11.2 Lot Expiration Date

- June 17, 2027

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

### 11.3 Period of Validity

- Sealed TCT Bag Open Date: \_\_\_\_\_

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

## 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

### Certificate Approved By:

Thomas Kozikowski  
Manager, Quality Control



### Certifying Officer:

Paul Gaines  
Chairman / Senior Technical Director



M5959 R: 6/14/24

300 Technology Drive  
Christiansburg, VA 24073 USA  
inorganicventures.com

P: 800-669-6799/540-585-3030

F: 540-585-3012

info@inorganicventures.com

## 1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



## 2.0 PRODUCT DESCRIPTION

Product Code: Single Analyte Custom Grade Solution  
Catalog Number: CGY10  
Lot Number: V2-Y740548  
Matrix: 2% (v/v) HNO<sub>3</sub>  
Value / Analyte(s): 10 000 µg/mL ea:  
Yttrium  
Starting Material: Yttrium Oxide  
Starting Material Lot#: 2661 and 06230520YL  
Starting Material Purity: 99.9984%

## 3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Value: 10000 ± 30 µg/mL  
Density: 1.032 g/mL (measured at 20 ± 4 °C)

### Assay Information:

|                 |                                                                 |
|-----------------|-----------------------------------------------------------------|
| Assay Method #1 | 10011 ± 25 µg/mL<br>EDTA NIST SRM 928 Lot Number: 928           |
| Assay Method #2 | 9997 ± 50 µg/mL<br>ICP Assay NIST SRM 3167a Lot Number: 190730  |
| Assay Method #3 | 9984 ± 31 µg/mL<br>Calculated NIST SRM Lot Number: See Sec. 4.2 |

- The Calculated Value is a value calculated from the weight of a starting material that has been certified directly vs. a National Institute of Standards and Technology (NIST) SRM/RM. See Sec 4.2 for balance traceability.

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

### Characterization of CRM/RM by Two or More Methods

Certified Value,  $X_{CRM/RM}$ , where two or more methods of characterization are used is the weighted mean of the results:

$$X_{CRM/RM} = \sum(w_i)(X_i)$$

$X_i$  = mean of Assay Method  $i$  with standard uncertainty  $u_{char i}$

$w_i$  = the weighting factors for each method calculated using the inverse square of the variance:

$$w_i = (1/u_{char i}^2) / (\sum(1/u_{char i}^2))$$

$$CRM/RM \text{ Expanded Uncertainty } (z) = U_{CRM/RM} = k(u_{char}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$$

$k$  = coverage factor = 2

$u_{char} = [\sum(w_i)^2(u_{char i}^2)]^{1/2}$  where  $u_{char i}$  are the errors from each characterization method

$u_{bb}$  = bottle to bottle homogeneity standard uncertainty

$u_{lts}$  = long term stability standard uncertainty (storage)

$u_{ts}$  = transport stability standard uncertainty

### Characterization of CRM/RM by One Method

Certified Value,  $X_{CRM/RM}$ , where one method of characterization is used is the mean of individual results:

$$X_{CRM/RM} = (X_a)(u_{char a})$$

$X_a$  = mean of Assay Method A with

$u_{char a}$  = the standard uncertainty of characterization Method A

$$CRM/RM \text{ Expanded Uncertainty } (z) = U_{CRM/RM} = k(u_{char a}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$$

$k$  = coverage factor = 2

$u_{char a}$  = the errors from characterization

$u_{bb}$  = bottle to bottle homogeneity standard uncertainty

$u_{lts}$  = long term stability standard uncertainty (storage)

$u_{ts}$  = transport stability standard uncertainty

## 4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

### 4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

### 4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

### 4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

## 5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

CRM/RMs are tested for trace metallic impurities by Axial ICP-OES and ICP-MS. The result from the most sensitive method for each element, is reported below. Solutions tested by ICP-MS were analyzed in an ULPA-Filtered Clean Room. An ULPA-Filter is 99.9985% efficient for the removal of particles down to 0.3 µm.

|        |          |        |          |        |          |        |          |        |          |
|--------|----------|--------|----------|--------|----------|--------|----------|--------|----------|
| M Ag < | 0.004600 | M Eu   | 0.009037 | M Na   | 0.086360 | M Se < | 0.005200 | M Zn   | 0.030125 |
| M Al   | 0.014862 | O Fe   | 0.002410 | M Nb < | 0.000570 | O Si   | 0.024100 | O Zr < | 0.002600 |
| M As < | 0.003500 | M Ga < | 0.000570 | M Nd   | 0.000923 | M Sm   | 0.000461 |        |          |
| M Au < | 0.001700 | M Gd < | 0.003500 | M Ni < | 0.005700 | M Sn < | 0.002300 |        |          |
| O B    | 0.002209 | M Ge < | 0.005200 | M Os < | 0.001200 | M Sr < | 0.004600 |        |          |
| O Ba < | 0.002500 | M Hf < | 0.000570 | n P <  |          | M Ta < | 0.000570 |        |          |
| O Be < | 0.001400 | M Hg < | 0.000570 | M Pb   | 0.005020 | M Tb   | 0.001044 |        |          |
| M Bi < | 0.003500 | M Ho   | 0.009037 | M Pd < | 0.005100 | M Te < | 0.002300 |        |          |
| O Ca   | 0.009841 | M In < | 0.002300 | M Pr < | 0.002300 | M Th < | 0.000570 |        |          |
| M Cd < | 0.000570 | M Ir < | 0.000570 | M Pt < | 0.000570 | M Ti < | 0.003500 |        |          |
| M Ce < | 0.002300 | O K    | 0.018677 | M Rb < | 0.000570 | M Tl < | 0.000570 |        |          |
| M Co < | 0.000570 | M La   | 0.000461 | M Re < | 0.000570 | M Tm < | 0.003500 |        |          |
| M Cr < | 0.004000 | O Li < | 0.009300 | M Rh < | 0.008000 | M U <  | 0.000570 |        |          |
| M Cs < | 0.000570 | M Lu   | 0.000582 | M Ru < | 0.000570 | M V    | 0.001265 |        |          |
| M Cu   | 0.002610 | O Mg   | 0.001486 | n S <  |          | M W <  | 0.002300 |        |          |
| M Dy   | 0.003815 | M Mn   | 0.000582 | M Sb   | 0.005422 | s Y <  |          |        |          |
| M Er   | 0.003615 | M Mo < | 0.005700 | M Sc < | 0.001200 | M Yb   | 0.001827 |        |          |

M - Checked by ICP-MS      O - Checked by ICP-OES      i - Spectral Interference  
n - Not Checked For      s - Solution Standard Element

## 6.0 INTENDED USE

6.1 This standard is intended for the calibration of analytical instruments and validation of analytical methods as appropriate. This CRM may be used in connection with EPA Methods 6010, 6020 (all versions), Standard Methods 3120 B and USP <232> / ICH Q3D.



6.2 For products attaining traceability through Inorganic Ventures' Primary Certified Reference Materials (PCRM™) see the Limited License to Use PCRM™ in the Inorganic Ventures Terms and Conditions of Sale, <https://www.inorganicventures.com/terms-and-conditions-sale>. The Terms and Conditions contain information on the use of materials traceable to PCRM™ certified reference materials. This Limited License agreement is especially pertinent for laboratories accredited under ISO:17034.

## 7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

### 7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.
- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.
- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit [www.inorganicventures.com/TCT](http://www.inorganicventures.com/TCT)

**Atomic Weight; Valence; Coordination Number; Chemical Form in Solution** - 88.91 +3 6 Y(OH)(H<sub>2</sub>O)<sub>x+2</sub>

**Chemical Compatibility** -Soluble in HCl, H<sub>2</sub>SO<sub>4</sub> and HNO<sub>3</sub>. Avoid HF, H<sub>3</sub>PO<sub>4</sub> and neutral to basic media.

Stable with most metals and inorganic anions forming an insoluble carbonate, oxide, oxalate, and fluoride.

Avoid mixing with elements / solutions containing moderate amounts of fluoride.

**Stability** - 2-100 ppb levels stable for months in 1% HNO<sub>3</sub> / LDPE container. 1-10,000 ppm solutions chemically stable for years in 2-5% HNO<sub>3</sub> / LDPE container.

**Y Containing Samples (Preparation and Solution)** - Metal (Soluble in acids); Oxide (Dissolve by heating in H<sub>2</sub>O / HNO<sub>3</sub>); Ores (Carbonate fusion in PtO followed by HCl dissolution); Organic Matrices (Dry ash and dissolve in 1:1 H<sub>2</sub>O / HCl or HNO<sub>3</sub>).

**Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/axial view):**

| Technique/Line     | Estimated D.L.         | Order | Interferences (underlined indicates severe) |
|--------------------|------------------------|-------|---------------------------------------------|
| ICP-MS 89 amu      | 0.8 ppt                | N/A   | 73Ge16O, 178Hf+2                            |
| ICP-OES 360.073 nm | 0.005 / 0.000036 µg/mL | 1     | Ce, Th                                      |
| ICP-OES 371.030 nm | 0.004 / 0.00007 µg/mL  | 1     | Ce                                          |
| ICP-OES 377.433 nm | 0.005 / 0.0009 µg/mL   | 1     | Ta, Th                                      |

## 8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

## 9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

## 10.0 QUALITY STANDARD DOCUMENTATION

### 10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

### 10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

### 10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

## 11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

### 11.1 Certification Issue Date

February 20, 2024

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

### 11.2 Lot Expiration Date

- February 20, 2029

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

### 11.3 Period of Validity

- Sealed TCT Bag Open Date: \_\_\_\_\_

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

## 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

### Certificate Prepared By:

Uyen Truong  
Custom Processing Supervisor



### Certificate Approved By:

Muzzammil Khan  
Stock Laboratory Supervisor



### Certifying Officer:

Paul Gaines  
Chairman / Senior Technical Director





**CERTIFIED WEIGHT REPORT:**

MS961 R-1 6/11/24

Lot #

Part Number:

57028

Solvent: 24002546 Nitric Acid

Lot Number:

041124

Description:

Nickel (NI)

Expiration Date:

041127

2%

5.0

Nitric Acid

Recommended Storage:

Ambient (20 °C)

(mL)

Nominal Concentration (µg/mL):

1000

NIST Test Number:

6UTB

5E-05 Balance Uncertainty

Weight shown below was diluted to (mL):

249.85

0.002 Flask Uncertainty

|                |                 |        |
|----------------|-----------------|--------|
| Formulated By: | Brian Geddes    | 041124 |
| Reviewed By:   | Pedro L. Rentas | 041124 |

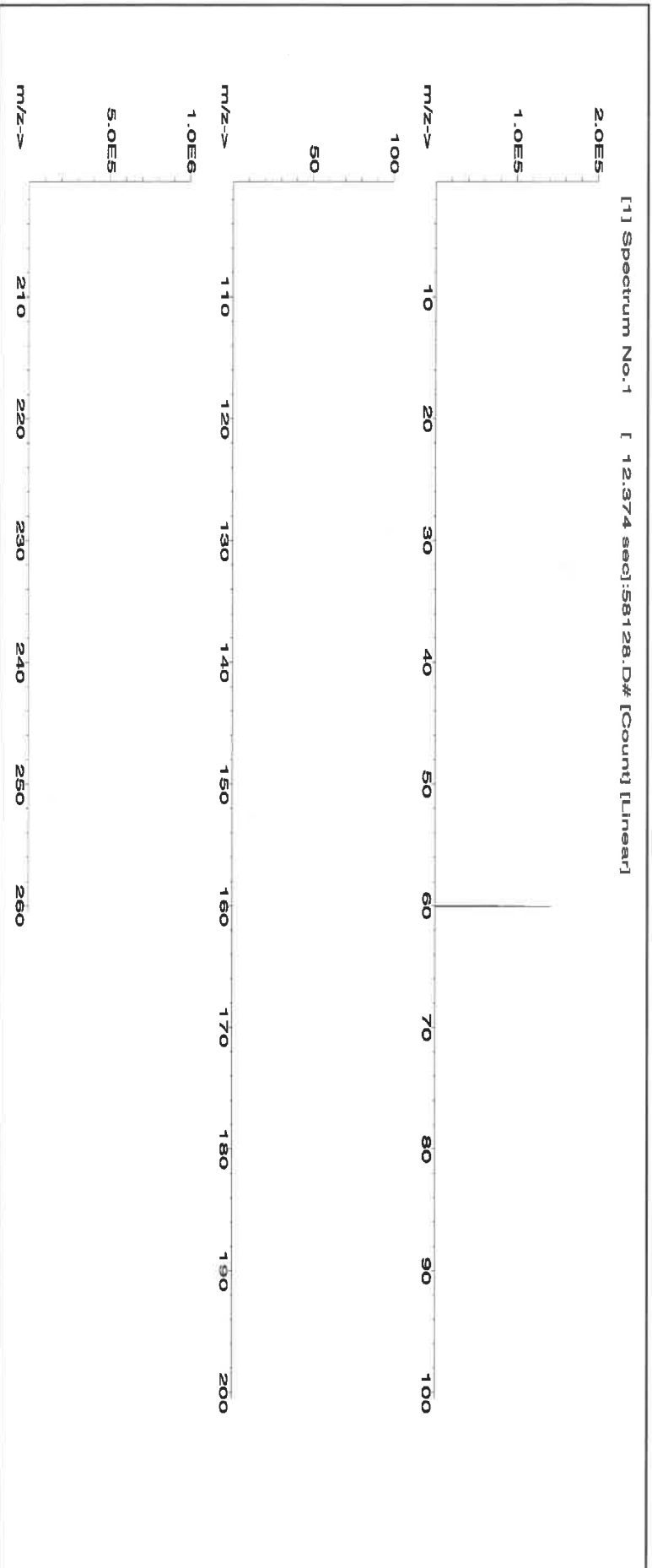
**SDS Information**

**Compound**

| Lot    | Nominal       | Purity | Uncertainty | Assay | Target     | Actual     | Actual        | Uncertainty | (Solvent Safety Info. On Attached pg.) |                |      | NIST |
|--------|---------------|--------|-------------|-------|------------|------------|---------------|-------------|----------------------------------------|----------------|------|------|
| Number | Conc. (µg/mL) | (%)    | Purity (%)  | (%)   | Weight (g) | Weight (g) | Conc. (µg/mL) | +/- (µg/mL) | CAS#                                   | OSHA PEL (TWA) | LD50 | SRM  |

1. Nickel(II) nitrate hexahydrate (NI) IN033 NIM052023A1 1000 99.999 0.10 20.2 1.2369 1.2369 1000.0 2.0 13478-00-7 1 mg/m3 or-rat 1620 mg/kg 3136

[1] Spectrum No.1 [ 12.374 sec]:58128.D# [Count] [Linear]





**Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):**

**Trace Metals Verification by ICP-MS (µg/mL)**

|    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |
|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|
| Al | <0.02 | Cd | <0.02 | Dy | <0.02 | Hf | <0.02 | Li | <0.02 | Ni | T     | Pr | <0.02 | Se | <0.2  | Tb | <0.02 | W  | <0.02 |
| Sb | <0.02 | Ca | <0.2  | Er | <0.02 | Ho | <0.02 | Lu | <0.02 | Nb | <0.02 | Re | <0.02 | Si | <0.02 | Te | <0.02 | U  | <0.02 |
| As | <0.2  | Ce | <0.02 | Ba | <0.02 | In | <0.02 | Mg | <0.01 | Os | <0.02 | Rh | <0.02 | Ag | <0.02 | Tl | <0.02 | V  | <0.02 |
| Ba | <0.02 | Cs | <0.02 | Gd | <0.02 | Ir | <0.02 | Mn | <0.02 | Pd | <0.02 | Rb | <0.02 | Na | <0.2  | Th | <0.02 | Yb | <0.02 |
| Bc | <0.01 | Cr | <0.02 | Ga | <0.02 | Fe | <0.2  | Hg | <0.2  | P  | <0.02 | Ru | <0.02 | Sr | <0.02 | Tm | <0.02 | Y  | <0.02 |
| Bi | <0.02 | Co | <0.02 | Ge | <0.02 | La | <0.02 | Mo | <0.02 | Pt | <0.02 | Sm | <0.02 | S  | <0.02 | Sn | <0.02 | Zn | <0.02 |
| B  | <0.02 | Cu | <0.02 | Au | <0.02 | Pb | <0.02 | Nd | <0.02 | K  | <0.2  | Sc | <0.02 | Ta | <0.02 | Ti | <0.02 | Zr | <0.02 |

(T) = Target analyte

**Physical Characterization:**

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
- \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- \* Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- \* All standards should be stored with caps tight and under appropriate laboratory conditions.
- \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



**M5962** **R10614124**



**CERTIFIED WEIGHT REPORT:**

**Part Number:** 57034  
**Lot Number:** 060624  
**Description:** Selenium (Se)

**Lot #** 24002546  
**Solvent:** Nitric Acid

2.0% 40.0 (mL) Nitric Acid

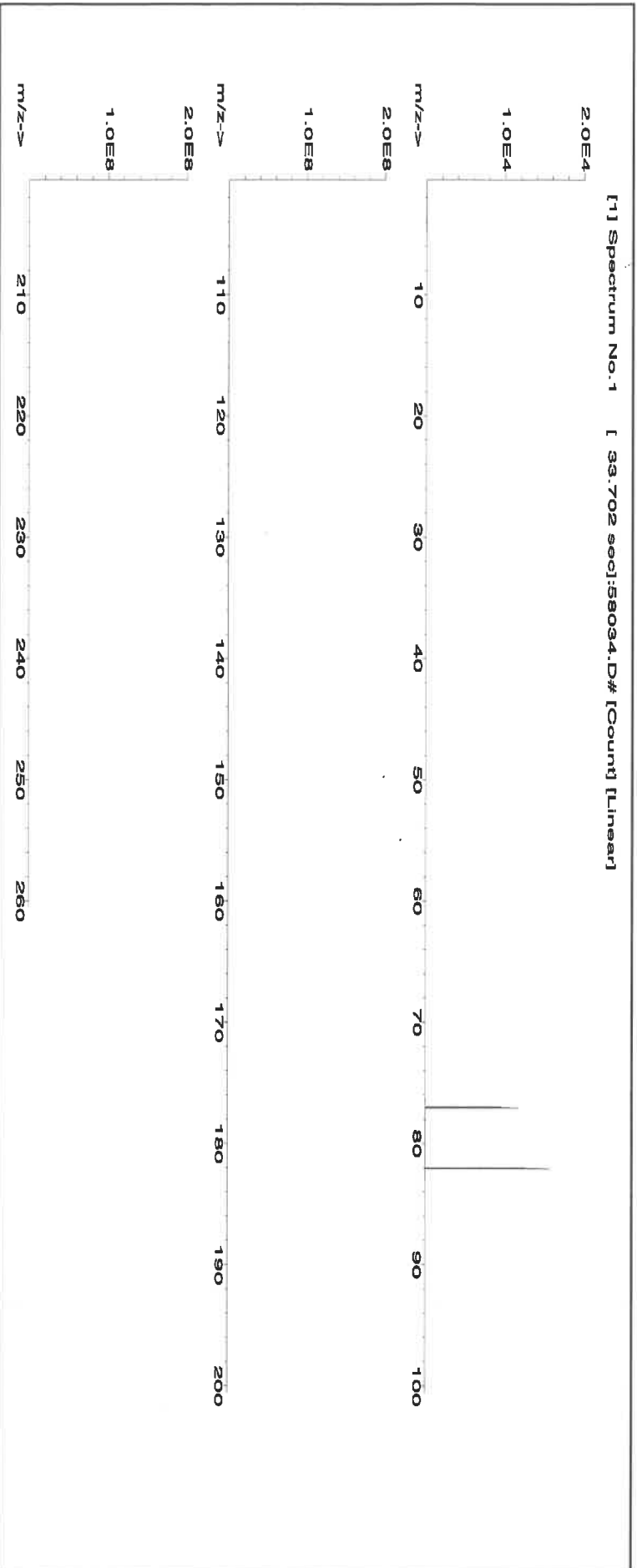
**Expiration Date:** 060627  
**Recommended Storage:** Ambient (20 °C)  
**Nominal Concentration (µg/mL):** 1000  
**NIST Test Number:** 6LUTB  
**Volume shown below was diluted to (mL):** 2000.07  
**SE-05** Balance Uncertainty  
**0.100** Flask Uncertainty

|                |                 |
|----------------|-----------------|
|                |                 |
| Formulated By: | Benson Chan     |
| 060624         |                 |
|                |                 |
| Reviewed By:   | Pedro L. Rantas |
| 060624         |                 |

**SDS Information**

| Compound | Part Number | Lot Number | Dilution Factor | Initial Vol. (mL) | Pipette (mL) | Nominal Conc. (µg/mL) | Initial Conc. (µg/mL) | Final Conc. (µg/mL) | Expanded Uncertainty +/- (µg/mL) | (Solvent Safety Info. On Attached pg.) | CAS# | OSHA PEL (TWA) | LDSO | NIST SRM |
|----------|-------------|------------|-----------------|-------------------|--------------|-----------------------|-----------------------|---------------------|----------------------------------|----------------------------------------|------|----------------|------|----------|
|----------|-------------|------------|-----------------|-------------------|--------------|-----------------------|-----------------------|---------------------|----------------------------------|----------------------------------------|------|----------------|------|----------|

|                  |       |        |        |       |       |      |         |        |     |           |           |                    |      |
|------------------|-------|--------|--------|-------|-------|------|---------|--------|-----|-----------|-----------|--------------------|------|
| 1. Selenium (Se) | 58134 | 071223 | 0.1000 | 200.0 | 0.084 | 1000 | 10002.5 | 1000.0 | 2.2 | 7782-49-2 | 0.2 mg/m3 | or-tral 6700 mg/kg | 3149 |
|------------------|-------|--------|--------|-------|-------|------|---------|--------|-----|-----------|-----------|--------------------|------|





**Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):**

**Trace Metals Verification by ICP-MS (µg/mL)**

|    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |    |       |
|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|----|-------|
| Al | <0.02 | Cd | <0.02 | Dy | <0.02 | Hf | <0.02 | Li | <0.02 | Ni | <0.02 | Pt | <0.02 | Se | T     | Tb | W  | <0.02 |
| Sb | <0.02 | Ca | <0.2  | Er | <0.02 | Ho | <0.02 | Lu | <0.02 | Nb | <0.02 | Re | <0.02 | Si | <0.02 | Te | U  | <0.02 |
| As | <0.2  | Ce | <0.02 | Eu | <0.02 | In | <0.02 | Mg | <0.01 | Os | <0.02 | Rh | <0.02 | Ag | <0.02 | Tl | V  | <0.02 |
| Ba | <0.02 | Cs | <0.02 | Gd | <0.02 | Ir | <0.02 | Mn | <0.02 | Pd | <0.02 | Ru | <0.02 | Na | <0.2  | Th | Yb | <0.02 |
| Be | <0.01 | Cr | <0.02 | Ga | <0.02 | Fe | <0.2  | Hg | <0.2  | P  | <0.02 | Sr | <0.02 | S  | <0.02 | Tm | Y  | <0.02 |
| Bi | <0.02 | Co | <0.02 | Ge | <0.02 | La | <0.02 | Mo | <0.02 | Pt | <0.02 | Sm | <0.02 | Ta | <0.02 | Sn | Zn | <0.02 |
| B  | <0.02 | Cu | <0.02 | Au | <0.02 | Pb | <0.02 | Nd | <0.02 | K  | <0.2  | Sc | <0.02 |    | <0.02 | Ti | Zr | <0.02 |

(T) = Target analyte

**Physical Characterization:**

Homogeneity: No heterogeneity was observed in the preparation of this standard.

**Certified by:**

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
- \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- \* Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- \* All standards should be stored with caps tight and under appropriate laboratory conditions.
- \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

# Certificate of Analysis

M5976, M5977

R: 02/22/24

P: 800-669-6799/540-585-3030  
F: 540-585-3012  
info@inorganicventures.com

## 1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



## 2.0 PRODUCT DESCRIPTION

Product Code: Single Analyte Custom Grade Solution  
Catalog Number: CGMO1  
Lot Number: T2-MO720876  
Matrix: H2O  
tr. NH4OH  
Value / Analyte(s): 1 000 µg/mL ea:  
Molybdenum  
Starting Material: Ammonium Molybdate  
Starting Material Lot#: 2361  
Starting Material Purity: 99.9893%

## 3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Value: 998 ± 7 µg/mL  
Density: 1.000 g/mL (measured at 20 ± 4 °C)  
Assay Information:

Assay Method #1 998 ± 4 µg/mL  
ICP Assay NIST SRM 3134 Lot Number: 130418

- The Calculated Value is a value calculated from the weight of a starting material that has been certified directly vs. a National Institute of Standards and Technology (NIST) SRM/RM. See Sec 4.2 for balance traceability.

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of  $k = 2$ .

### Characterization of CRM/RM by Two or More Methods

Certified Value,  $X_{CRM/RM}$ , where two or more methods of characterization are used is the weighted mean of the results:

$$X_{CRM/RM} = \sum (w_i) (X_i)$$

$X_i$  = mean of Assay Method  $i$  with standard uncertainty  $u_{char i}$

$w_i$  = the weighting factors for each method calculated using the inverse square of the variance.

$$w_i = (1/u_{char i}^2) / (\sum (1/u_{char i}^2))$$

$$CRM/RM \text{ Expanded Uncertainty } (\pm) = U_{CRM/RM} = k (u_{char}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$$

$k$  = coverage factor = 2

$u_{char} = [\sum (w_i)^2 (u_{char i}^2)]^{1/2}$  where  $u_{char i}$  are the errors from each characterization method

$u_{bb}$  = bottle to bottle homogeneity standard uncertainty

$u_{lts}$  = long term stability standard uncertainty (storage)

$u_{ts}$  = transport stability standard uncertainty

### Characterization of CRM/RM by One Method

Certified Value,  $X_{CRM/RM}$ , where one method of characterization is used is the mean of individual results:

$$X_{CRM/RM} = (X_a) (u_{char a})$$

$X_a$  = mean of Assay Method A with

$u_{char a}$  = the standard uncertainty of characterization Method A

$$CRM/RM \text{ Expanded Uncertainty } (\pm) = U_{CRM/RM} = k (u_{char a}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$$

$k$  = coverage factor = 2

$u_{char a}$  = the errors from characterization

$u_{bb}$  = bottle to bottle homogeneity standard uncertainty

$u_{lts}$  = long term stability standard uncertainty (storage)

$u_{ts}$  = transport stability standard uncertainty

#### 4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

##### 4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

##### 4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

##### 4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

#### 5.0 TRACE METALLIC IMPURITIES (TMI ) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

CRM/RMs are tested for trace metallic impurities by Axial ICP-OES and ICP-MS. The result from the most sensitive method for each element, is reported below. Solutions tested by ICP-MS were analyzed in an ULPA-Filtered Clean Room. An ULPA-Filter is 99.9985% efficient for the removal of particles down to 0.3 µm.

|   |    |   |          |   |    |   |          |   |    |   |          |   |    |   |          |   |    |   |          |
|---|----|---|----------|---|----|---|----------|---|----|---|----------|---|----|---|----------|---|----|---|----------|
| M | Ag | < | 0.000590 | M | Eu | < | 0.000300 | M | Na |   | 0.000879 | M | Se | < | 0.008000 | M | Zn |   | 0.000598 |
| M | Al |   | 0.000563 | M | Fe | < | 0.006500 | M | Nb | < | 0.029000 | i | Si | < |          | M | Zr | < | 0.001800 |
| M | As | < | 0.002100 | M | Ga | < | 0.000300 | i | Nd | < |          | M | Sm | < | 0.000300 |   |    |   |          |
| M | Au | < | 0.000300 | M | Gd | < | 0.000300 | M | Ni | < | 0.008000 | M | Sn | < | 0.008900 |   |    |   |          |
| M | B  | < | 0.003300 | M | Ge | < | 0.000300 | M | Os | < | 0.000590 | M | Sr |   | 0.000175 |   |    |   |          |
| M | Ba |   | 0.001689 | M | Hf | < | 0.001800 | i | P  | < |          | M | Ta | < | 0.004200 |   |    |   |          |
| M | Be | < | 0.000890 | M | Hg | < | 0.003300 | M | Pb | < | 0.000300 | M | Tb | < | 0.000300 |   |    |   |          |
| M | Bi | < | 0.000890 | M | Ho | < | 0.000300 | M | Pd | < | 0.001800 | M | Te | < | 0.021000 |   |    |   |          |
| O | Ca |   | 0.006334 | M | In | < | 0.032000 | M | Pr | < | 0.013000 | M | Th | < | 0.000300 |   |    |   |          |
| O | Cd | < | 0.026000 | M | Ir | < | 0.000300 | M | Pt | < | 0.000300 | O | Tl | < | 0.032000 |   |    |   |          |
| M | Ce | < | 0.008300 | M | K  |   | 0.130213 | M | Rb |   | 0.004575 | M | Tl |   | 0.001266 |   |    |   |          |
| M | Co |   | 0.000598 | M | La | < | 0.000300 | M | Re | < | 0.000300 | M | Tm | < | 0.000300 |   |    |   |          |
| M | Cr |   | 0.000527 | O | Li |   | 0.000059 | M | Rh | < | 0.000300 | M | U  | < | 0.005300 |   |    |   |          |
| M | Cs |   | 0.000527 | M | Lu | < | 0.000300 | M | Ru | < | 0.079000 | M | V  | < | 0.000890 |   |    |   |          |
| M | Cu |   | 0.002252 | M | Mg |   | 0.000563 | i | S  | < |          | M | W  |   | 0.087982 |   |    |   |          |
| M | Dy | < | 0.000300 | M | Mn | < | 0.005900 | M | Sb |   | 0.001513 | M | Y  | < | 0.000300 |   |    |   |          |
| M | Er | < | 0.000300 | s | Mo | < |          | M | Sc | < | 0.001200 | M | Yb | < | 0.000300 |   |    |   |          |

M - Checked by ICP-MS    O - Checked by ICP-OES    i - Spectral Interference  
n - Not Checked For    s - Solution Standard Element

#### 6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

#### 7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

##### 7.1 Storage and Handling Recommendations



- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit [www.inorganicventures.com/TCT](http://www.inorganicventures.com/TCT)

**Atomic Weight; Valence; Coordination Number; Chemical Form in Solution** - 95.94 +6 6,7,8,9

[MoO4]-2(chemical form as received)

**Chemical Compatibility** -Mo is received in a NH4OH matrix giving the operator the option of using HCl or HF to stabilize acidic solutions. The [MoO4]-2 is soluble in concentrated HCl [MoOCl5]-2, dilute HF / HNO3 [MoOF5]-2 and basic media [MoO4]-2. Stable at ppm levels with some metals provided it is fluorinated. Do not mix with Alkaline or Rare Earths when HF is present. Stable with most inorganic anions provided it is in the [MoO4]-2 chemical form.

**Stability** - 2-100 ppb levels stable (alone or mixed with all other metals that are at comparable levels) as the [MoOF5]-2 for months in 1% HNO3 / LDPE container. 1-10,000 ppm single element solutions as the [MoO4]-2 chemically stable for years in 1% NH4OH in a LDPE container.

**Mo Containing Samples (Preparation and Solution)** -Metal (Soluble in HF / HNO3 or hot dilute HCl); Oxide (soluble in HF or NH4OH) ; Organic Matrices (Dry ash at 450EC in Pt0 and dissolve oxide with HF or HCl ).

**Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/axial view):**

| Technique/Line     | Estimated D.L.       | Order | Interferences (underlined indicates severe) |
|--------------------|----------------------|-------|---------------------------------------------|
| ICP-MS 95 amu      | 3 ppt                | n/a   | 40Ar39K16O,79Br16O,190Os2+,190Pt2+          |
| ICP-OES 202.030 nm | 0.008 / 0.0002 µg/mL | 1     | Os, Hf                                      |
| ICP-OES 203.844 nm | 0.012 / 0.002 µg/mL  | 1     |                                             |
| ICP-OES 204.598 nm | 0.012 / 0.001 µg/mL  | 1     | Ir, Ta                                      |

## 8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

## 9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

## 10.0 QUALITY STANDARD DOCUMENTATION

### 10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

### 10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

### 10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.569.6799; 540.585.3030, Fax: 540.585.3012; [info@inorganicventures.com](mailto:info@inorganicventures.com)

## 11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

### 11.1 Certification Issue Date

July 17, 2022

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

### 11.2 Lot Expiration Date

- July 17, 2027

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

### 11.3 Period of Validity

- Sealed TCT Bag Open Date: \_\_\_\_\_

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

## 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

### Certificate Prepared By:

Uyen Truong  
Supervisor, Product Documentation



### Certificate Approved By:

Michael Booth  
Director, Technical



### Certifying Officer:

Paul Gaines  
Chairman / Senior Technical Director



## 1.0 ACCREDITATION / REGISTRATION

**INORGANIC VENTURES** is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



## 2.0 PRODUCT DESCRIPTION

Product Code: Single Analyte Custom Grade Solution  
Catalog Number: CGMO1  
Lot Number: T2-MO720876  
Matrix: H2O  
tr. NH4OH  
Value / Analyte(s): 1 000 µg/mL ea:  
Molybdenum  
Starting Material: Ammonium Molybdate  
Starting Material Lot#: 2361  
Starting Material Purity: 99.9893%

## 3.0 CERTIFIED VALUES AND UNCERTAINTIES

**Certified Value:** 998 ± 7 µg/mL  
**Density:** 1.000 g/mL (measured at 20 ± 4 °C)  
**Assay Information:**

**Assay Method #1**      **998 ± 4 µg/mL**  
ICP Assay NIST SRM 3134 Lot Number: 130418

- The Calculated Value is a value calculated from the weight of a starting material that has been certified directly vs. a National Institute of Standards and Technology (NIST) SRM/RM. See Sec 4.2 for balance traceability.

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of  $k = 2$ .

### Characterization of CRM/RM by Two or More Methods

Certified Value,  $X_{CRM/RM}$ , where two or more methods of characterization are used is the weighted mean of the results:

$$X_{CRM/RM} = \sum (w_i) (X_i)$$

$X_i$  = mean of Assay Method  $i$  with standard uncertainty  $u_{char i}$

$w_i$  = the weighting factors for each method calculated using the inverse square of the variance.

$$w_i = (1/u_{char i}^2) / (\sum (1/u_{char i}^2))$$

$$CRM/RM \text{ Expanded Uncertainty } (\pm) = U_{CRM/RM} = k (u_{char}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$$

$k$  = coverage factor = 2

$u_{char} = [\sum (w_i)^2 (u_{char i}^2)]^{1/2}$  where  $u_{char i}$  are the errors from each characterization method

$u_{bb}$  = bottle to bottle homogeneity standard uncertainty

$u_{lts}$  = long term stability standard uncertainty (storage)

$u_{ts}$  = transport stability standard uncertainty

### Characterization of CRM/RM by One Method

Certified Value,  $X_{CRM/RM}$ , where one method of characterization is used is the mean of individual results:

$$X_{CRM/RM} = (X_a) (u_{char a})$$

$X_a$  = mean of Assay Method A with

$u_{char a}$  = the standard uncertainty of characterization Method A

$$CRM/RM \text{ Expanded Uncertainty } (\pm) = U_{CRM/RM} = k (u_{char a}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$$

$k$  = coverage factor = 2

$u_{char a}$  = the errors from characterization

$u_{bb}$  = bottle to bottle homogeneity standard uncertainty

$u_{lts}$  = long term stability standard uncertainty (storage)

$u_{ts}$  = transport stability standard uncertainty

#### 4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

##### 4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

##### 4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

##### 4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

#### 5.0 TRACE METALLIC IMPURITIES (TMI ) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

CRM/RMs are tested for trace metallic impurities by Axial ICP-OES and ICP-MS. The result from the most sensitive method for each element, is reported below. Solutions tested by ICP-MS were analyzed in an ULPA-Filtered Clean Room. An ULPA-Filter is 99.9985% efficient for the removal of particles down to 0.3 µm.

|   |    |   |          |   |    |   |          |   |    |   |          |   |    |   |          |   |    |   |          |
|---|----|---|----------|---|----|---|----------|---|----|---|----------|---|----|---|----------|---|----|---|----------|
| M | Ag | < | 0.000590 | M | Eu | < | 0.000300 | M | Na |   | 0.000879 | M | Se | < | 0.008000 | M | Zn |   | 0.000598 |
| M | Al |   | 0.000563 | M | Fe | < | 0.006500 | M | Nb | < | 0.029000 | i | Si | < |          | M | Zr | < | 0.001800 |
| M | As | < | 0.002100 | M | Ga | < | 0.000300 | i | Nd | < |          | M | Sm | < | 0.000300 |   |    |   |          |
| M | Au | < | 0.000300 | M | Gd | < | 0.000300 | M | Ni | < | 0.008000 | M | Sn | < | 0.008900 |   |    |   |          |
| M | B  | < | 0.003300 | M | Ge | < | 0.000300 | M | Os | < | 0.000590 | M | Sr |   | 0.000175 |   |    |   |          |
| M | Ba |   | 0.001689 | M | Hf | < | 0.001800 | i | P  | < |          | M | Ta | < | 0.004200 |   |    |   |          |
| M | Be | < | 0.000890 | M | Hg | < | 0.003300 | M | Pb | < | 0.000300 | M | Tb | < | 0.000300 |   |    |   |          |
| M | Bi | < | 0.000890 | M | Ho | < | 0.000300 | M | Pd | < | 0.001800 | M | Te | < | 0.021000 |   |    |   |          |
| O | Ca |   | 0.006334 | M | In | < | 0.032000 | M | Pr | < | 0.013000 | M | Th | < | 0.000300 |   |    |   |          |
| O | Cd | < | 0.026000 | M | Ir | < | 0.000300 | M | Pt | < | 0.000300 | O | Ti | < | 0.032000 |   |    |   |          |
| M | Ce | < | 0.008300 | M | K  |   | 0.130213 | M | Rb |   | 0.004575 | M | Tl |   | 0.001266 |   |    |   |          |
| M | Co |   | 0.000598 | M | La | < | 0.000300 | M | Re | < | 0.000300 | M | Tm | < | 0.000300 |   |    |   |          |
| M | Cr |   | 0.000527 | O | Li |   | 0.000059 | M | Rh | < | 0.000300 | M | U  | < | 0.005300 |   |    |   |          |
| M | Cs |   | 0.000527 | M | Lu | < | 0.000300 | M | Ru | < | 0.079000 | M | V  | < | 0.000890 |   |    |   |          |
| M | Cu |   | 0.002252 | M | Mg |   | 0.000563 | i | S  | < |          | M | W  |   | 0.087982 |   |    |   |          |
| M | Dy | < | 0.000300 | M | Mn | < | 0.005900 | M | Sb |   | 0.001513 | M | Y  | < | 0.000300 |   |    |   |          |
| M | Er | < | 0.000300 | s | Mo | < |          | M | Sc | < | 0.001200 | M | Yb | < | 0.000300 |   |    |   |          |

M - Checked by ICP-MS    O - Checked by ICP-OES    i - Spectral Interference  
n - Not Checked For    s - Solution Standard Element

#### 6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

#### 7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

##### 7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit [www.inorganicventures.com/TCT](http://www.inorganicventures.com/TCT)

**Atomic Weight; Valence; Coordination Number; Chemical Form in Solution** - 95.94 +6 6,7,8,9

[MoO4]-2(chemical form as received)

**Chemical Compatibility** -Mo is received in a NH4OH matrix giving the operator the option of using HCl or HF to stabilize acidic solutions. The [MoO4]-2 is soluble in concentrated HCl [MoOCl5]-2, dilute HF / HNO3 [MoOF5]-2 and basic media [MoO4]-2. Stable at ppm levels with some metals provided it is fluorinated. Do not mix with Alkaline or Rare Earths when HF is present. Stable with most inorganic anions provided it is in the [MoO4]-2 chemical form.

**Stability** - 2-100 ppb levels stable (alone or mixed with all other metals that are at comparable levels) as the [MoOF5]-2 for months in 1% HNO3 / LDPE container. 1-10,000 ppm single element solutions as the [MoO4]-2 chemically stable for years in 1% NH4OH in a LDPE container.

**Mo Containing Samples (Preparation and Solution)** -Metal (Soluble in HF / HNO3 or hot dilute HCl); Oxide (soluble in HF or NH4OH) ; Organic Matrices (Dry ash at 450EC in Pt0 and dissolve oxide with HF or HCl ).

**Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/axial view):**

| Technique/Line     | Estimated D.L.       | Order | Interferences (underlined indicates severe) |
|--------------------|----------------------|-------|---------------------------------------------|
| ICP-MS 95 amu      | 3 ppt                | n/a   | 40Ar39K16O,79Br16O,190Os2+,190Pt2+          |
| ICP-OES 202.030 nm | 0.008 / 0.0002 µg/mL | 1     | Os, Hf                                      |
| ICP-OES 203.844 nm | 0.012 / 0.002 µg/mL  | 1     |                                             |
| ICP-OES 204.598 nm | 0.012 / 0.001 µg/mL  | 1     | Ir, Ta                                      |

## 8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

## 9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

## 10.0 QUALITY STANDARD DOCUMENTATION

### 10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

### 10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

### 10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.569.6799; 540.585.3030, Fax: 540.585.3012; [info@inorganicventures.com](mailto:info@inorganicventures.com)

## 11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

### 11.1 Certification Issue Date

July 17, 2022

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

### 11.2 Lot Expiration Date

- July 17, 2027

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

### 11.3 Period of Validity

- Sealed TCT Bag Open Date: \_\_\_\_\_

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

## 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

### Certificate Prepared By:

Uyen Truong  
Supervisor, Product Documentation



### Certificate Approved By:

Michael Booth  
Director, Technical



### Certifying Officer:

Paul Gaines  
Chairman / Senior Technical Director





# Certificate of Analysis

Refine your results. Redefine your industry.

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**INORGANIC VENTURES** is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories".  
Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).

## 1.0 ACCREDITATION / REGISTRATION

## 2.0 PRODUCT DESCRIPTION

Product Code: Single Analyte Custom Grade Solution

Catalog Number: CGT1

Lot Number: T2-T1719972

Matrix: 2% (v/v) HNO<sub>3</sub>

Value / Analyte(s): Ti, HF

Starting Material: Titanium

Starting Material Lot#: 2094

Starting Material Purity: 99.9975%

## 3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Value: 1002 ± 5 µg/mL

Density: 1.012 g/mL (measured at 20 ± 4 °C)

Assay Method #1

1002 ± 4 µg/mL

ICP Assay NIST SRM 3162a Lot Number: 130925

- The Calculated Value is a value calculated from the weight of a starting material that has been certified directly vs. a National Institute of Standards and Technology (NIST) SRM/RM. See Sec 4.2 for balance traceability.

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

### Characterization of CRM/RM by Two or More Methods

Certified Value,  $X_{CRM/RM}$ , where two or more methods of characterization are used is the weighted mean of the results:

$$X_{CRM/RM} = 2(w) / (w_1 + w_2)$$

$w_1$  = the weighting factors for each method calculated using the inverse square of the variance

$$w_1 = (1/u_{CRM/RM}^2) / (1/u_{CRM/RM}^2 + 1/u_{CRM/RM}^2)$$

$$u_{CRM/RM}^2 = (u_{CRM/RM}^2 + u_{CRM/RM}^2 + u_{CRM/RM}^2 + u_{CRM/RM}^2) / 2$$

$k$  = coverage factor = 2

$$u_{CRM/RM} = (2(w) / (w_1 + w_2)) \times \sqrt{(u_{CRM/RM}^2 + u_{CRM/RM}^2 + u_{CRM/RM}^2 + u_{CRM/RM}^2)}$$

$u_{CRM/RM}$  = long term stability standard uncertainty (storage)

$u_{CRM/RM}$  = bottle to bottle homogeneity standard uncertainty

$u_{CRM/RM}$  = long term stability standard uncertainty (storage)

$u_{CRM/RM}$  = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

CRM/RMs are tested for trace metallic impurities by Axial ICP-OES and ICP-MS. The result from the most sensitive method for each element, is reported below. Solutions tested by ICP-MS were analyzed in an UHPA-filtered Clean Room. An UHPA-filter is 99.9985% efficient for the removal of particles down to 0.3 µm.

|      |   |          |      |   |          |      |   |          |      |   |          |      |   |          |
|------|---|----------|------|---|----------|------|---|----------|------|---|----------|------|---|----------|
| M Ag | < | 0.000536 | M Eu | < | 0.000268 | O Na | < | 0.032670 | M Se | < | 0.001204 | O Zn | < | 0.003267 |
| M Al | < | 0.000872 | O Fe | < | 0.003225 | O Nb | < | 0.043560 | O Si | < | 0.004735 | O Zr | < | 0.043560 |
| M As | < | 0.008586 | M Ga | < | 0.000268 | M Nd | < | 0.000268 | M Sm | < | 0.000268 |      |   |          |
| M Au | < | 0.004577 | M Gd | < | 0.000268 | O Ni | < | 0.010890 | M Sn | < | 0.000986 |      |   |          |
| O B  | < | 0.008929 | M Ge | < | 0.002146 | M Os | < | 0.000269 | O Sr | < | 0.000986 |      |   |          |
| M Ba | < | 0.002683 | M Hf | < | 0.002161 | O P  | < | 0.054450 | M Ta | < | 0.010560 |      |   |          |
| M Be | < | 0.005366 | M Hg | < | 0.003231 | M Pb | < | 0.001073 | M Tb | < | 0.000268 |      |   |          |
| M Bi | < | 0.001609 | M Ho | < | 0.000268 | M Pd | < | 0.000268 | M Th | < | 0.001341 |      |   |          |
| O Ca | < | 0.000676 | M In | < | 0.002683 | M Pr | < | 0.000268 | M Tl | < | 0.053663 |      |   |          |
| M Cd | < | 0.000268 | M Ir | < | 0.000269 | M Pt | < | 0.000536 | S Tl | < |          |      |   |          |
| M Co | < | 0.000268 | M K  | < | 0.001172 | M Rb | < | 0.000268 | M Ti | < | 0.000268 |      |   |          |
| M Cr | < | 0.000752 | O Li | < | 0.000268 | M Re | < | 0.000268 | M Tm | < | 0.000268 |      |   |          |
| M Cs | < | 0.000268 | M Lu | < | 0.000268 | M Rh | < | 0.000268 | M U  | < | 0.000268 |      |   |          |
| O Cu | < | 0.010890 | O Mg | < | 0.005445 | I S  | < | 0.006976 | M Y  | < | 0.002146 |      |   |          |
| M Dy | < | 0.000268 | O Mn | < | 0.003267 | M Sb | < | 0.004900 | M Yb | < | 0.000536 |      |   |          |
| M Er | < | 0.000268 | M Mo | < | 0.000774 | O Sc | < |          |      |   |          |      |   |          |

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations



- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit [www.inorganicventures.com/TCT](http://www.inorganicventures.com/TCT)

**Atomic Weight; Valence; Coordination Number; Chemical Form in Solution** - 47.87 ± 4.6 Ti(F)<sub>6</sub>-2 media. Unstable at ppm levels with metals that would pull F- away (i.e. Do not mix with Alkaline or Rare Earths or high levels of transition elements unless they are fluorinated). Stable with most inorganic anions with a tendency to hydrolyze forming the hydrated oxide in all dilute acids except HF.

**Stability** - 2-100 ppb levels stable (Alone or mixed with all other metals) as the Ti(F)<sub>6</sub>-2 for months in 1% HNO<sub>3</sub> / LDPE container. 1-10,000 ppm single element solutions as the Ti(F)<sub>6</sub>-2 chemically stable for years in 2-5% HNO<sub>3</sub> / trace HF in an LDPE container.

**TI Containing Samples (Preparation and Solution)** - Metal (Soluble in H<sub>2</sub>O / HF caution - powder reacts violently). Oxide - low temperature history anatase or rutile (Dissolved by heating in 1:1:1 H<sub>2</sub>O / HF / H<sub>2</sub>SO<sub>4</sub>); K<sub>2</sub>SiO<sub>7</sub> - no KF if silica not present); Organic Matrices (Dry ash at 450EC in P10 and dissolve by heating with 1:1:1 H<sub>2</sub>O / HF / H<sub>2</sub>SO<sub>4</sub> or fuse ash with pyrosulfate if oxide is as plastic pigment and likely in brookite crystaline form).

**Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/axial view):**

| Technique/Line     | Estimated D.L.         | Order | Interferences (undeline indicates severe) |
|--------------------|------------------------|-------|-------------------------------------------|
| ICP-MS 48 amu      | 14 ppt                 | N/A   | 32S16O, 32S14N,                           |
| ICP-OES 323.452 nm | 0.0054 / 0.00092 µg/mL | 1     | 14N17N2, 36Ar12C,                         |
| ICP-OES 334.941 nm | 0.0038 / 0.00028 µg/mL | 1     | 48Ca, [96X=2                              |
| ICP-OES 336.121 nm | 0.0053 / 0.00034 µg/mL | 1     | W, Mo, Co                                 |
|                    |                        |       | Nb, Ta, Cr, U                             |
|                    |                        |       | Ce, Ar, Ni                                |
|                    |                        |       | Ru]]                                      |
|                    |                        |       | (where X = Zr, Mo,                        |

## HAZARDOUS INFORMATION

HF Note: This standard should not be prepared or stored in glass.

## HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

## QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, VA 24073, USA; Telephone: 800.868.6786; 540.565.3030; Fax: 540.565.3030; Email: info@inorganicventures.com; <http://www.inorganicventures.com>

11.0

CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

June 17, 2022

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- June 17, 2027

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date:

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0

NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Thomas Kozlikowski  
Manager, Quality Control

Certifying Officer:

Paul Gaines  
Chairman / Senior Technical Director

*Paul Gaines*

*80978*

# Certificate of Analysis

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*R: 6/14/24*

## 1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



## 2.0 PRODUCT DESCRIPTION

Product Code: Single Analyte Custom Grade Solution  
Catalog Number: CGIN10  
Lot Number: U2-IN729349  
Matrix: 5% (v/v) HNO<sub>3</sub>  
Value / Analyte(s): 10 000 µg/mL ea:  
Indium  
Starting Material: Indium Metal  
Starting Material Lot#: 2511  
Starting Material Purity: 99.9995%

## 3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Value: 10022 ± 30 µg/mL  
Density: 1.044 g/mL (measured at 20 ± 4 °C)

### Assay Information:

|                 |                                                                  |
|-----------------|------------------------------------------------------------------|
| Assay Method #1 | 10021 ± 56 µg/mL<br>ICP Assay NIST SRM 3124a Lot Number: 110516  |
| Assay Method #2 | 10035 ± 25 µg/mL<br>EDTA NIST SRM 928 Lot Number: 928            |
| Assay Method #3 | 10001 ± 33 µg/mL<br>Calculated NIST SRM Lot Number: See Sec. 4.2 |

- The Calculated Value is a value calculated from the weight of a starting material that has been certified directly vs. a National Institute of Standards and Technology (NIST) SRM/RM. See Sec 4.2 for balance traceability.

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

### Characterization of CRM/RM by Two or More Methods

Certified Value,  $X_{CRM/RM}$ , where two or more methods of characterization are used is the weighted mean of the results:

$$X_{CRM/RM} = \sum (w_i) (X_i)$$

$X_i$  = mean of Assay Method  $i$  with standard uncertainty  $u_{char i}$

$w_i$  = the weighting factors for each method calculated using the inverse square of the variance:

$$w_i = (1/u_{char i}^2) / (\sum (1/u_{char i}^2))$$

$$CRM/RM \text{ Expanded Uncertainty } (k) = U_{CRM/RM} = k (u_{char}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$$

$k$  = coverage factor = 2

$u_{char} = [\sum (w_i)^2 (u_{char i}^2)]^{1/2}$  where  $u_{char i}$  are the errors from each characterization method

$u_{bb}$  = bottle to bottle homogeneity standard uncertainty

$u_{lts}$  = long term stability standard uncertainty (storage)

$u_{ts}$  = transport stability standard uncertainty

### Characterization of CRM/RM by One Method

Certified Value,  $X_{CRM/RM}$ , where one method of characterization is used is the mean of individual results:

$$X_{CRM/RM} = (X_a) (u_{char a})$$

$X_a$  = mean of Assay Method A with

$u_{char a}$  = the standard uncertainty of characterization Method A

$$CRM/RM \text{ Expanded Uncertainty } (k) = U_{CRM/RM} = k (u_{char a}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$$

$k$  = coverage factor = 2

$u_{char a}$  = the errors from characterization

$u_{bb}$  = bottle to bottle homogeneity standard uncertainty

$u_{lts}$  = long term stability standard uncertainty (storage)

$u_{ts}$  = transport stability standard uncertainty

## 4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

### 4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

### 4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

### 4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

## 5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

CRM/RMs are tested for trace metallic impurities by Axial ICP-OES and ICP-MS. The result from the most sensitive method for each element, is reported below. Solutions tested by ICP-MS were analyzed in an ULPA-Filtered Clean Room. An ULPA-Filter is 99.9985% efficient for the removal of particles down to 0.3 µm.

|   |    |          |          |    |          |          |          |    |          |          |          |          |    |          |          |          |   |          |
|---|----|----------|----------|----|----------|----------|----------|----|----------|----------|----------|----------|----|----------|----------|----------|---|----------|
| M | Ag | <        | 0.000760 | M  | Eu       | <        | 0.000760 | O  | Na       | 0.012771 | M        | Se       | <  | 0.023000 | M        | Zn       | < | 0.006100 |
| M | Al | 0.003385 | O        | Fe | 0.004462 | M        | Nb       | <  | 0.000760 | O        | Si       | 0.024619 | M  | Zr       | <        | 0.000760 |   |          |
| M | As | <        | 0.004600 | M  | Ga       | <        | 0.000760 | M  | Nd       | <        | 0.000760 | M        | Sm | <        | 0.000760 |          |   |          |
| M | Au | <        | 0.002300 | M  | Gd       | <        | 0.000760 | O  | Ni       | <        | 0.005100 | M        | Sn | <        | 0.000760 |          |   |          |
| O | B  | 0.003692 | M        | Ge | <        | 0.001600 | M        | Os | <        | 0.000760 | O        | Sr       | <  | 0.000610 |          |          |   |          |
| M | Ba | <        | 0.001600 | M  | Hf       | <        | 0.000760 | n  | P        | <        |          | M        | Ta | <        | 0.000760 |          |   |          |
| O | Be | <        | 0.000130 | M  | Hg       | <        | 0.003100 | M  | Pb       | 0.001400 | M        | Tb       | <  | 0.000760 |          |          |   |          |
| M | Bi | <        | 0.000760 | M  | Ho       | <        | 0.000760 | M  | Pd       | <        | 0.001600 | M        | Te | <        | 0.000760 |          |   |          |
| O | Ca | 0.004616 | s        | In | <        |          |          | M  | Pr       | <        | 0.000760 | M        | Th | <        | 0.000760 |          |   |          |
| M | Cd | <        | 0.000760 | M  | Ir       | <        | 0.000760 | M  | Pt       | <        | 0.000760 | O        | Ti | <        | 0.001100 |          |   |          |
| M | Ce | <        | 0.000760 | O  | K        | 0.007078 | M        | Rb | <        | 0.000760 | M        | Tl       | <  | 0.000760 |          |          |   |          |
| M | Co | <        | 0.000760 | M  | La       | <        | 0.000760 | M  | Re       | <        | 0.000760 | M        | Tm | <        | 0.000760 |          |   |          |
| O | Cr | <        | 0.001300 | O  | Li       | <        | 0.000130 | M  | Rh       | <        | 0.000760 | M        | U  | <        | 0.000760 |          |   |          |
| M | Cs | <        | 0.000760 | M  | Lu       | <        | 0.000760 | M  | Ru       | <        | 0.000760 | M        | V  | <        | 0.001600 |          |   |          |
| M | Cu | <        | 0.003800 | O  | Mg       | 0.000707 | n        | S  | <        |          | M        | W        | <  | 0.001600 |          |          |   |          |
| M | Dy | <        | 0.000760 | O  | Mn       | 0.000149 | M        | Sb | <        | 0.000760 | M        | Y        | <  | 0.000760 |          |          |   |          |
| M | Er | <        | 0.000760 | M  | Mo       | <        | 0.002300 | M  | Sc       | <        | 0.000760 | M        | Yb | <        | 0.000760 |          |   |          |

M - Checked by ICP-MS

O - Checked by ICP-OES

i - Spectral Interference

n - Not Checked For

s - Solution Standard Element

## 6.0 INTENDED USE

6.1 This standard is intended for the calibration of analytical instruments and validation of analytical methods as appropriate. This CRM may be used in connection with EPA Methods 6010, 6020 (all versions), Standard Methods 3120 B and USP <232> / ICH Q3D.

6.2 For products attaining traceability through Inorganic Ventures' Primary Certified Reference Materials (PCRM™) see the Limited License to Use PCRM™ in the Inorganic Ventures Terms and Conditions of Sale. <https://www.inorganicventures.com/terms-and-conditions-sale>. The Terms and Conditions contain information on the use of materials traceable to PCRM™ certified reference materials. This Limited License agreement is especially pertinent for laboratories accredited under ISO:17034.

## 7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

### 7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.
- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.
- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit [www.inorganicventures.com/TCT](http://www.inorganicventures.com/TCT)

**Atomic Weight; Valence; Coordination Number; Chemical Form In Solution** - 114.82 +3 6 In(H<sub>2</sub>O)<sub>6</sub>+3

**Chemical Compatibility** -Soluble in HCl, HNO<sub>3</sub>, and H<sub>2</sub>SO<sub>4</sub>. Avoid neutral and basic media. Stable with most metals and inorganic anions. The oxalate, sulfide, carbonate, hydroxide and phosphate are insoluble in water.

**Stability** - 2-100 ppb levels stable for months in 1% HNO<sub>3</sub> / LDPE container. 1-10,000 ppm solutions chemically stable for years in 2-5% HNO<sub>3</sub> / LDPE container.

**In Containing Samples (Preparation and Solution)** -Metal (Best dissolved in HCl / HNO<sub>3</sub>); Oxide (Soluble in mineral acids); Ores (Carbonate fusion in PtO followed by HCl dissolution); Organic Matrices (Sulfuric/peroxide digestion or dry ash and dissolution in dilute HCl).

**Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/axial view):**

| Technique/Line     | Estimated D.L.     | Order | Interferences (underlined indicates severe) |
|--------------------|--------------------|-------|---------------------------------------------|
| ICP-MS 115 amu     | 1 ppt              | n/a   | 115Sn, 99Ru16O                              |
| ICP-OES 158.583 nm | 0.05 / 0.002 µg/mL | 1     |                                             |
| ICP-OES 230.606 nm | 0.1 / 0.03 µg/mL   | 1     | Ni, Os                                      |
| ICP-OES 325.609 nm | 0.2 / 0.05 µg/mL   | 1     | Mn, Mo, Th                                  |

## 8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

## 9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

## 10.0 QUALITY STANDARD DOCUMENTATION

### 10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

### 10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

### 10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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## 11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

### 11.1 Certification Issue Date

February 21, 2023

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

### 11.2 Lot Expiration Date

- February 21, 2028

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

### 11.3 Period of Validity

- Sealed TCT Bag Open Date: \_\_\_\_\_

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

## 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

### Certificate Approved By:

Thomas Kozikowski  
Manager, Quality Control



### Certifying Officer:

Paul Gaines  
Chairman / Senior Technical Director





Refine your results. Redefine your industry.

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# Certificate of Analysis

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## 1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



## 2.0 PRODUCT DESCRIPTION

Product Code: Multi Analyte Custom Grade Solution  
Catalog Number: CHEM-CLP-4  
Lot Number: V2-MEB746762  
Matrix: 3% (v/v) HNO<sub>3</sub>  
3% (v/v) HF  
Value / Analyte(s): 1 000 µg/mL ea:  
Boron, Molybdenum,  
Silicon, Tin,  
Titanium

## 3.0 CERTIFIED VALUES AND UNCERTAINTIES

| ANALYTE      | CERTIFIED VALUE | ANALYTE        | CERTIFIED VALUE |
|--------------|-----------------|----------------|-----------------|
| Boron, B     | 1 000 ± 5 µg/mL | Molybdenum, Mo | 1 000 ± 5 µg/mL |
| Silicon, Si  | 1 000 ± 7 µg/mL | Tin, Sn        | 1 000 ± 5 µg/mL |
| Titanium, Ti | 1 000 ± 6 µg/mL |                |                 |

Density: 1.033 g/mL (measured at 20 ± 4 °C)

### Assay Information:

| ANALYTE | METHOD     | NIST SRM#          | SRM LOT#     |
|---------|------------|--------------------|--------------|
| B       | ICP Assay  | 3107               | 190605       |
| B       | Calculated |                    | See Sec. 4.2 |
| Mo      | ICP Assay  | traceable to 3134  | U2-MO739068  |
| Si      | ICP Assay  | Traceable to 3150  | S2-SI702546  |
| Sn      | ICP Assay  | 3161a              | 140917       |
| Ti      | ICP Assay  | traceable to 3162a | T2-TI725816  |

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

#### Characterization of CRM/RM by Two or More Methods

Certified Value,  $X_{\text{CRM/RM}}$ , where two or more methods of characterization are used is the weighted mean of the results:

$$X_{\text{CRM/RM}} = \sum (w_i) (X_i)$$

$X_i$  = mean of Assay Method  $i$  with standard uncertainty  $u_{\text{char } i}$

$w_i$  = the weighting factors for each method calculated using the inverse square of the variance:

$$w_i = (1/u_{\text{char } i}^2) / (\sum (1/u_{\text{char } i}^2))$$

$$\text{CRM/RM Expanded Uncertainty } (\pm) = U_{\text{CRM/RM}} = k (u_{\text{char}}^2 + u_{\text{bb}}^2 + u_{\text{Its}}^2 + u_{\text{ts}}^2)^{1/2}$$

$k$  = coverage factor = 2

$u_{\text{char}} = [\sum (w_i)^2 (u_{\text{char } i}^2)]^{1/2}$  where  $u_{\text{char } i}$  are the errors from each characterization method

$u_{\text{bb}}$  = bottle to bottle homogeneity standard uncertainty

$u_{\text{Its}}$  = long term stability standard uncertainty (storage)

$u_{\text{ts}}$  = transport stability standard uncertainty

#### Characterization of CRM/RM by One Method

Certified Value,  $X_{\text{CRM/RM}}$ , where one method of characterization is used is the mean of individual results:

$$X_{\text{CRM/RM}} = (X_a) (u_{\text{char } a})$$

$X_a$  = mean of Assay Method A with

$u_{\text{char } a}$  = the standard uncertainty of characterization Method A

$$\text{CRM/RM Expanded Uncertainty } (\pm) = U_{\text{CRM/RM}} = k (u_{\text{char } a}^2 + u_{\text{bb}}^2 + u_{\text{Its}}^2 + u_{\text{ts}}^2)^{1/2}$$

$k$  = coverage factor = 2

$u_{\text{char } a}$  = the errors from characterization

$u_{\text{bb}}$  = bottle to bottle homogeneity standard uncertainty

$u_{\text{Its}}$  = long term stability standard uncertainty (storage)

$u_{\text{ts}}$  = transport stability standard uncertainty

## 4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

### 4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

### 4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

### 4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

## 5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/A

## 6.0 INTENDED USE

6.1 This standard is intended for the calibration of analytical instruments and validation of analytical methods as appropriate. This CRM may be used in connection with EPA Methods 6010, 6020 (all versions), Standard Methods 3120 B and USP <232> / ICH Q3D.

6.2 For products attaining traceability through Inorganic Ventures' Primary Certified Reference Materials (PCRM™) see the Limited License to Use PCRM™ in the Inorganic Ventures Terms and Conditions of Sale. <https://www.inorganicventures.com/terms-and-conditions-sale>. The Terms and Conditions contain information on the use of materials traceable to PCRM™ certified reference materials. This Limited License agreement is especially pertinent for laboratories accredited under ISO:17034.

## 7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

### 7.1 Storage and Handling Recommendations



- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit [www.inorganicventures.com/TCT](http://www.inorganicventures.com/TCT)

**HF Note:** This standard should not be prepared or stored in glass.

## **8.0 HAZARDOUS INFORMATION**

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

## **9.0 HOMOGENEITY**

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

## **10.0 QUALITY STANDARD DOCUMENTATION**

### **10.1 ISO 9001 Quality Management System Registration**

- QSR Certificate Number QSR-1034

### **10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"**

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

### **10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"**

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; [inorganicventures.com](http://inorganicventures.com); [info@inorganicventures.com](mailto:info@inorganicventures.com)

## **11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY**

### **11.1 Certification Issue Date**

September 06, 2024

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

### **11.2 Lot Expiration Date**

- **September 06, 2029**

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

### 11.3 Period of Validity

- Sealed TCT Bag Open Date: \_\_\_\_\_

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

#### Certificate Approved By:

Joseph Burns  
Custom VS Manager



#### Certifying Officer:

Paul Gaines  
Chairman / Senior Technical Director



Hydrochloric Acid, 36.5-38.0%  
BAKER INSTRA-ANALYZED® Reagent  
For Trace Metal Analysis

avantor™



R → 16/13/24  
Met dig

M 6121

Material No.: 9530-33  
Batch No.: 0000275677  
Manufactured Date: 2020/12/16  
Retest Date: 2025/12/15  
Revision No: 1

## Certificate of Analysis

| Test                                      | Specification | Result  |
|-------------------------------------------|---------------|---------|
| ACS – Assay (as HCl) (by acid-base titrn) | 36.5 – 38.0 % | 37.6    |
| ACS – Color (APHA)                        | ≤ 10          | 5       |
| ACS – Residue after Ignition              | ≤ 3 ppm       | 1       |
| ACS – Specific Gravity at 60°/60°F        | 1.185 – 1.192 | 1.190   |
| ACS – Bromide (Br)                        | ≤ 0.005 %     | < 0.005 |
| ACS – Extractable Organic Substances      | ≤ 5 ppm       | 1       |
| ACS – Free Chlorine (as Cl <sub>2</sub> ) | ≤ 0.5 ppm     | < 0.5   |
| Phosphate (PO <sub>4</sub> )              | ≤ 0.05 ppm    | < 0.03  |
| Sulfate (SO <sub>4</sub> )                | ≤ 0.5 ppm     | < 0.3   |
| Sulfite (SO <sub>3</sub> )                | ≤ 0.8 ppm     | 0.3     |
| Ammonium (NH <sub>4</sub> )               | ≤ 3 ppm       | < 1     |
| Trace Impurities – Arsenic (As)           | ≤ 0.010 ppm   | < 0.003 |
| Trace Impurities – Aluminum (Al)          | ≤ 10.0 ppb    | < 0.2   |
| Arsenic and Antimony (as As)              | ≤ 5 ppb       | < 3     |
| Trace Impurities – Barium (Ba)            | ≤ 1.0 ppb     | < 0.2   |
| Trace Impurities – Beryllium (Be)         | ≤ 1.0 ppb     | < 0.2   |
| Trace Impurities – Bismuth (Bi)           | ≤ 10.0 ppb    | < 1.0   |
| Trace Impurities – Boron (B)              | ≤ 20.0 ppb    | < 5.0   |
| Trace Impurities – Cadmium (Cd)           | ≤ 1.0 ppb     | < 0.3   |
| Trace Impurities – Calcium (Ca)           | ≤ 50.0 ppb    | 29.7    |
| Trace Impurities – Chromium (Cr)          | ≤ 1.0 ppb     | < 0.4   |
| Trace Impurities – Cobalt (Co)            | ≤ 1.0 ppb     | < 0.3   |
| Trace Impurities – Copper (Cu)            | ≤ 1.0 ppb     | < 0.1   |
| Trace Impurities – Gallium (Ga)           | ≤ 1.0 ppb     | < 0.2   |

For questions on this Certificate of Analysis please contact Technical Services at 855.282.6867 or +1.610.386.1700

Avantor Performance Materials, LLC

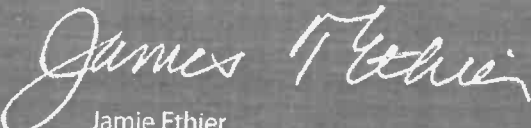
100 Matsonford Rd, Suite 200, Radnor, PA 19087. U.S.A. Phone: 610.386.1700

Material No.: 9530-33  
Batch No.: 0000275677

| Test                                                   | Specification | Result |
|--------------------------------------------------------|---------------|--------|
| Trace Impurities – Germanium (Ge)                      | <= 3.0 ppb    | < 2.0  |
| Trace Impurities – Gold (Au)                           | <= 4.0 ppb    | < 0.2  |
| Heavy Metals (as Pb)                                   | <= 100 ppb    | < 50   |
| Trace Impurities – Iron (Fe)                           | <= 15.0 ppb   | < 1    |
| Trace Impurities – Lead (Pb)                           | <= 1.0 ppb    | < 0.5  |
| Trace Impurities – Lithium (Li)                        | <= 1.0 ppb    | 0.2    |
| Trace Impurities – Magnesium (Mg)                      | <= 10.0 ppb   | 0.4    |
| Trace Impurities – Manganese (Mn)                      | <= 1.0 ppb    | < 0.4  |
| Trace Impurities – Mercury (Hg)                        | <= 0.5 ppb    | 0.1    |
| Trace Impurities – Molybdenum (Mo)                     | <= 10.0 ppb   | < 5.0  |
| Trace Impurities – Nickel (Ni)                         | <= 4.0 ppb    | < 0.3  |
| Trace Impurities – Niobium (Nb)                        | <= 1.0 ppb    | < 0.2  |
| Trace Impurities – Potassium (K)                       | <= 9.0 ppb    | < 2.0  |
| Trace Impurities – Selenium (Se), For Information Only | ppb           | 1.0    |
| Trace Impurities – Silicon (Si)                        | <= 100.0 ppb  | < 10.0 |
| Trace Impurities – Silver (Ag)                         | <= 1.0 ppb    | < 0.3  |
| Trace Impurities – Sodium (Na)                         | <= 100.0 ppb  | < 5.0  |
| Trace Impurities – Strontium (Sr)                      | <= 1.0 ppb    | < 0.2  |
| Trace Impurities – Tantalum (Ta)                       | <= 1.0 ppb    | < 0.9  |
| Trace Impurities – Thallium (Tl)                       | <= 5.0 ppb    | < 2.0  |
| Trace Impurities – Tin (Sn)                            | <= 5.0 ppb    | < 0.8  |
| Trace Impurities – Titanium (Ti)                       | <= 1.0 ppb    | 0.2    |
| Trace Impurities – Vanadium (V)                        | <= 1.0 ppb    | < 0.2  |
| Trace Impurities – Zinc (Zn)                           | <= 5.0 ppb    | 0.3    |
| Trace Impurities – Zirconium (Zr)                      | <= 1.0 ppb    | < 0.1  |

For Laboratory, Research or Manufacturing Use  
Product Information (not specifications):  
Appearance (clear, fuming liquid)  
Meets ACS Specifications

Country of Origin: US  
Packaging Site: Phillipsburg Mfg Ctr & DC

  
Jamie Ethier  
Vice President Global Quality

For questions on this Certificate of Analysis please contact Technical Services at 855.282.6867 or +1.610.386.1700

Avantor Performance Materials, LLC  
100 Matsonford Rd, Suite 200, Radnor, PA 19087. U.S.A. Phone: 610.386.1700

M612 S

Receive → 11/22/24

# CORCO CHEMICAL CORPORATION

Manufacturers of ACS Reagents and Semiconductor Grade Chemicals

Office and Plant  
299 Cedar Lane  
Fairless Hills, PA 19030

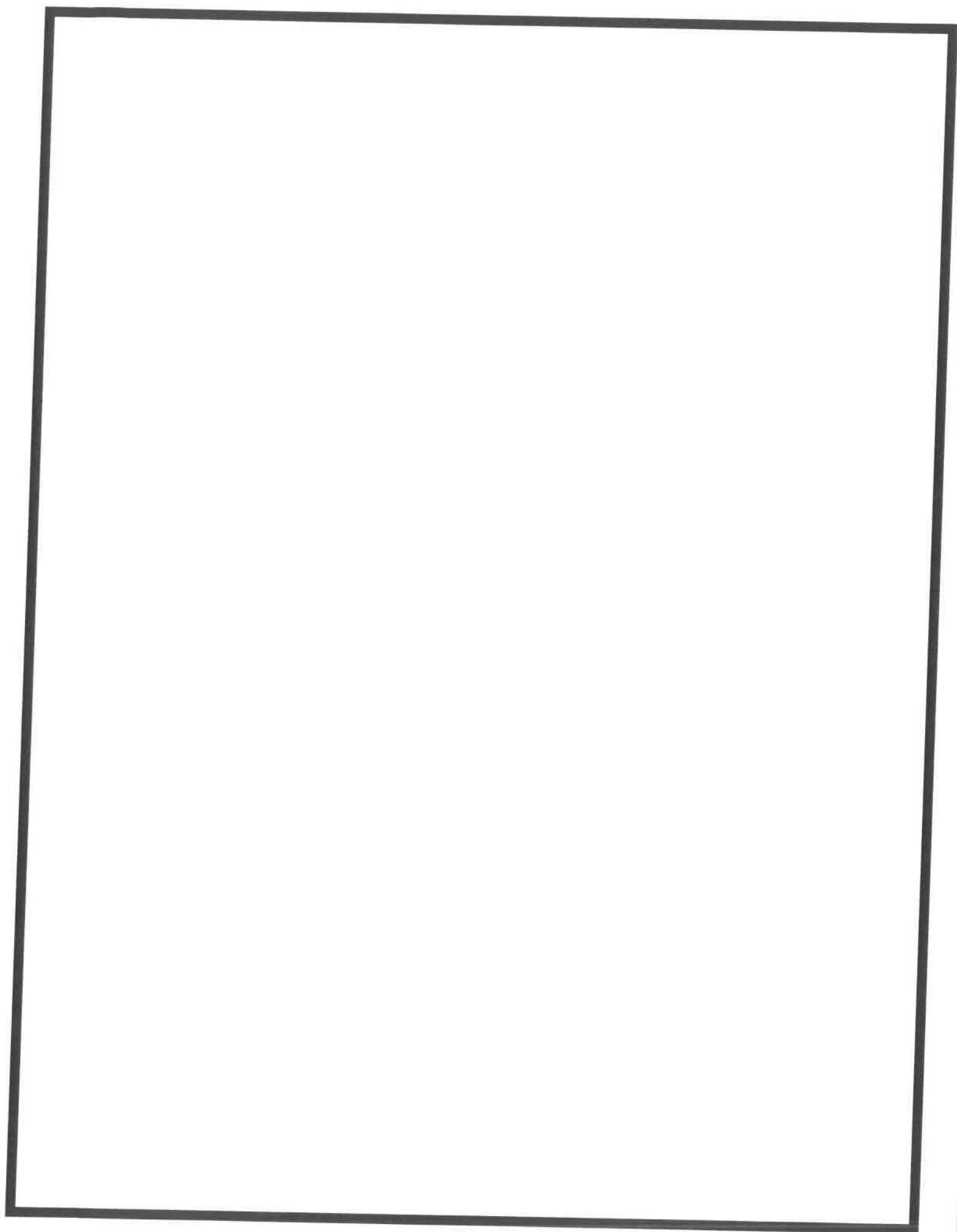
Phone: 215-295-5006  
Fax: 215-295-0781

## Hydrogen Peroxide 30%, ACS Reagent Grade

### SPECIFICATION

### MAXIMUM LIMITS

|                             |                                                         |
|-----------------------------|---------------------------------------------------------|
| Appearance                  | Colorless and free from<br>suspended matter or sediment |
| Assay                       | 29-32%                                                  |
| Color (APHA)                | 10                                                      |
| Residue after Evaporation   | 0.002%                                                  |
| Titrateable Acid            | 0.0006 meq/g                                            |
| Chloride (Cl)               | 3 ppm                                                   |
| Nitrate (NO <sub>3</sub> )  | 2 ppm                                                   |
| Phosphate                   | 2 ppm                                                   |
| Sulfate (SO <sub>4</sub> )  | 5 ppm                                                   |
| Ammonium (NH <sub>4</sub> ) | 5 ppm                                                   |
| Heavy Metals (as Pb)        | 1 ppm                                                   |
| Iron (Fe)                   | 0.5 ppm                                                 |



Nitric Acid 69%  
CMOS



R → 11/12/24

M6126

Material No.: 9606-03  
Batch No.: 24D1062002  
Manufactured Date: 2024-03-26  
Retest Date: 2029-03-25  
Revision No.: 0

## Certificate of Analysis

| Test                              | Specification | Result      |
|-----------------------------------|---------------|-------------|
| Assay (HNO <sub>3</sub> )         | 69.0 – 70.0 % | 69.7 %      |
| Appearance                        | Passes Test   | Passes Test |
| Color (APHA)                      | ≤ 10          | 5           |
| Residue after Ignition            | ≤ 2 ppm       | 1 ppm       |
| Chloride (Cl)                     | ≤ 0.08 ppm    | < 0.03 ppm  |
| Phosphate (PO <sub>4</sub> )      | ≤ 0.10 ppm    | < 0.03 ppm  |
| Sulfate (SO <sub>4</sub> )        | ≤ 0.2 ppm     | < 0.2 ppm   |
| Trace Impurities – Aluminum (Al)  | ≤ 40.0 ppb    | < 1.0 ppb   |
| Arsenic and Antimony (as As)      | ≤ 5.0 ppb     | < 2.0 ppb   |
| Trace Impurities – Barium (Ba)    | ≤ 10.0 ppb    | < 1.0 ppb   |
| Trace Impurities – Beryllium (Be) | ≤ 10.0 ppb    | < 1.0 ppb   |
| Trace Impurities – Bismuth (Bi)   | ≤ 20.0 ppb    | < 10.0 ppb  |
| Trace Impurities – Boron (B)      | ≤ 10.0 ppb    | < 5.0 ppb   |
| Trace Impurities – Cadmium (Cd)   | ≤ 50 ppb      | < 1 ppb     |
| Trace Impurities – Calcium (Ca)   | ≤ 50.0 ppb    | 2.3 ppb     |
| Trace Impurities – Chromium (Cr)  | ≤ 30.0 ppb    | < 1.0 ppb   |
| Trace Impurities – Cobalt (Co)    | ≤ 10.0 ppb    | < 1.0 ppb   |
| Trace Impurities – Copper (Cu)    | ≤ 10.0 ppb    | < 1.0 ppb   |
| Trace Impurities – Gallium (Ga)   | ≤ 10.0 ppb    | < 1.0 ppb   |
| Trace Impurities – Germanium (Ge) | ≤ 20 ppb      | < 10 ppb    |
| Trace Impurities – Gold (Au)      | ≤ 20 ppb      | < 5 ppb     |
| Heavy Metals (as Pb)              | ≤ 100 ppb     | 100 ppb     |
| Trace Impurities – Iron (Fe)      | ≤ 40.0 ppb    | < 1.0 ppb   |
| Trace Impurities – Lead (Pb)      | ≤ 20.0 ppb    | < 10.0 ppb  |
| Trace Impurities – Lithium (Li)   | ≤ 10.0 ppb    | < 1.0 ppb   |
| Trace Impurities – Magnesium (Mg) | ≤ 20 ppb      | < 1 ppb     |
| Trace Impurities – Manganese (Mn) | ≤ 10.0 ppb    | < 1.0 ppb   |
| Trace Impurities – Nickel (Ni)    | ≤ 20.0 ppb    | < 5.0 ppb   |

>>> Continued on page 2 >>>

Nitric Acid 69%  
CMOS

 **avantor**<sup>TM</sup>



Material No.: 9606-03  
Batch No.: 24D1062002

| Test | Specification | Result |
|------|---------------|--------|
|------|---------------|--------|

For Microelectronic Use

Country of Origin: USA  
Packaging Site: Phillipsburg Mfg Ctr & DC



Jamie Croak  
Director Quality Operations, Bioscience Production





**CERTIFIED WEIGHT REPORT:**

**Part Number:** 58112  
**Lot Number:** 112124  
**Description:** Magnesium (Mg)  
**Lot #** R-1113125  
**Solvent:** 24012496 Nitric Acid

**Expiration Date:** 112127  
**Recommended Storage:** Ambient (20 °C)  
**Nitric Acid** 2% (40.0 mL)

**Nominal Concentration (µg/mL):** 10000

**NIST Test Number:** 6LUB

**Weight shown below was diluted to (mL):** 2000.07 0.100 Flask Uncertainty

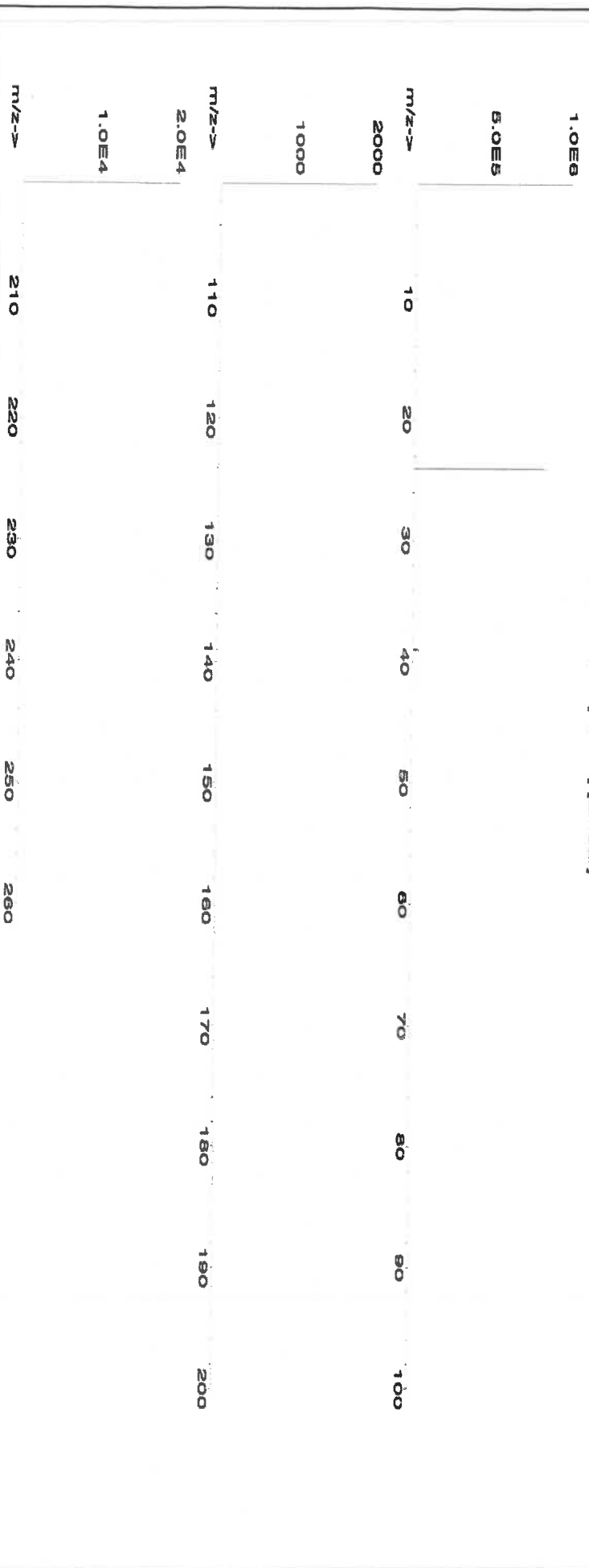
|                          |                        |
|--------------------------|------------------------|
| <i>Giovanni Esposito</i> |                        |
| Formulated By:           | Giovanni Esposito      |
| Reviewed By:             | <i>Pedro L. Rentas</i> |
|                          | 112124                 |

**Compound**

| Lot | Nominal | Purity        | Uncertainty | Assay      | Target     | Actual     | Actual        | Expanded  | SDS Information                        | NIST |
|-----|---------|---------------|-------------|------------|------------|------------|---------------|-----------|----------------------------------------|------|
| RM# | Number  | Conc. (µg/mL) | (%)         | Purity (%) | Weight (g) | Weight (g) | Conc. (µg/mL) | ± (µg/mL) | (Solvent Safety Info. On Attached pg.) | SRM  |

1. Magnesium nitrate hexahydrate (Mg) IN030 MG000023A1 10000 99.999 0.10 8.51 234.9183 234.9459 10001.2 20.0 13446-18-9 NA off-rat 5440 mg/kg 3131a

[1] Spectrum No. 1 [19.823 sec]:58112.D# [Count] [Linear]





**Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):**

**Trace Metals Verification by ICP-MS (µg/mL)**

|    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |
|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|
| Al | <0.02 | Cd | <0.02 | Dy | <0.02 | Hf | <0.02 | Li | <0.02 | Ni | <0.02 | Pt | <0.02 | Se | <0.2  | Tb | <0.02 | W  | <0.02 |
| Sb | <0.02 | Ca | <0.2  | Er | <0.02 | Ho | <0.02 | Lu | <0.02 | Nb | <0.02 | Rc | <0.02 | Si | <0.02 | Te | <0.02 | U  | <0.02 |
| As | <0.2  | Ce | <0.02 | Eu | <0.02 | In | <0.02 | Mg | T     | Os | <0.02 | Rb | <0.02 | Ag | <0.02 | Tl | <0.02 | V  | <0.02 |
| Ba | <0.02 | Cs | <0.02 | Gd | <0.02 | Ir | <0.02 | Mn | <0.02 | Pd | <0.02 | Ru | <0.02 | Na | <0.2  | Tm | <0.02 | Yb | <0.02 |
| Be | <0.01 | Cr | <0.02 | Ga | <0.02 | Fe | <0.2  | Hg | <0.2  | P  | <0.02 | Sm | <0.02 | Sr | <0.02 | Sn | <0.02 | Y  | <0.02 |
| Bi | <0.02 | Co | <0.02 | Ge | <0.02 | La | <0.02 | Mo | <0.02 | Pt | <0.02 | Sc | <0.02 | S  | <0.02 | Ti | <0.02 | Zn | <0.02 |
| B  | <0.02 | Cu | <0.02 | Au | <0.02 | Pb | <0.02 | Nd | <0.02 | K  | <0.2  |    |       | Ta | <0.02 |    |       | Zr | <0.02 |

(T) = Target analyte

**Physical Characterization:**

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
- \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- \* Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- \* All standards should be stored with caps tight and under appropriate laboratory conditions.
- \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



**CERTIFIED WEIGHT REPORT:**

Part Number:  
Lot Number:  
Description:

**58025**  
**101124**  
**Manganese (Mn)**

*R-71113128*

Lot #  
Solvent: 24002546 Nitric Acid

Expiration Date:

101127

2% 80.0 (mL) Nitric Acid

Recommended Storage:

Ambient (20 °C)

Nominal Concentration (µg/mL):

1000

NIST Test Number:

6UTB

Weight shown below was diluted to (mL):

4000.2

0.10 Flask Uncertainty

|                          |                          |
|--------------------------|--------------------------|
| <i>Giovanni Esposito</i> |                          |
| Formulated By:           | Giovanni Esposito        |
| Reviewed By:             | <i>Pedro L. Renteria</i> |
|                          | 101124                   |

**Compound**

| RM# | Lot Number | Nominal Conc. (µg/mL) | Purity (%) | Uncertainty Purity (%) | Assay (%) | Target Weight (g) | Actual Weight (g) | Actual Conc. (µg/mL) | Expanded Uncertainty +/- (µg/mL) | CAS# | OSHA PEL (TWA) | LD50 | NIST SRM |
|-----|------------|-----------------------|------------|------------------------|-----------|-------------------|-------------------|----------------------|----------------------------------|------|----------------|------|----------|
|-----|------------|-----------------------|------------|------------------------|-----------|-------------------|-------------------|----------------------|----------------------------------|------|----------------|------|----------|

1. Manganese(II) nitrate hydrate (Mn) IN031 MNM02020A1 1000 99.999 0.10 20.8 19.2322 19.2344 1000.1 2.0 15710-66-4 5 mg/m3 or-trt >300mg/kg 3132

[1] Spectrum No.1 [ 34.243 sec]:57025.D# [Count] [Linear]

|       |     |     |     |     |     |     |     |     |     |     |  |  |  |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|--|
| 5.0E6 |     |     |     |     |     |     |     |     |     |     |  |  |  |
| 2.5E6 |     |     |     |     |     |     |     |     |     |     |  |  |  |
| m/z-> | 10  | 20  | 30  | 40  | 50  | 60  | 70  | 80  | 90  | 100 |  |  |  |
| 1.0E6 |     |     |     |     |     |     |     |     |     |     |  |  |  |
| 5.0E7 |     |     |     |     |     |     |     |     |     |     |  |  |  |
| m/z-> | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 | 190 | 200 |  |  |  |
| 1.0E6 |     |     |     |     |     |     |     |     |     |     |  |  |  |
| 5.0E7 |     |     |     |     |     |     |     |     |     |     |  |  |  |
| m/z-> | 210 | 220 | 230 | 240 | 250 | 260 |     |     |     |     |  |  |  |



**Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):**

**Trace Metals Verification by ICP-MS (µg/mL)**

|    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |
|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|
| Al | <0.02 | Cd | <0.02 | Dy | <0.02 | Hf | <0.02 | Li | <0.02 | Ni | <0.02 | Pr | <0.02 | Se | <0.2  | Tb | <0.02 | W  | <0.02 |
| Sb | <0.02 | Ca | <0.2  | Er | <0.02 | Ho | <0.02 | Lu | <0.02 | Nb | <0.02 | Re | <0.02 | Si | <0.02 | Te | <0.02 | U  | <0.02 |
| As | <0.2  | Ce | <0.02 | Eu | <0.02 | In | <0.02 | Mg | <0.01 | Os | <0.02 | Rh | <0.02 | Ag | <0.02 | Tl | <0.02 | V  | <0.02 |
| Ba | <0.02 | Cs | <0.02 | Gd | <0.02 | Ir | <0.02 | Mn | T     | Pd | <0.02 | Rb | <0.02 | Na | <0.2  | Th | <0.02 | Yb | <0.02 |
| Be | <0.01 | Cr | <0.02 | Ga | <0.02 | Fe | <0.2  | Hg | <0.2  | P  | <0.02 | Ru | <0.02 | Sr | <0.02 | Tm | <0.02 | Y  | <0.02 |
| Bi | <0.02 | Co | <0.02 | Ge | <0.02 | La | <0.02 | Mo | <0.02 | Pt | <0.02 | Sm | <0.02 | S  | <0.02 | Sn | <0.02 | Zn | <0.02 |
| B  | <0.02 | Cu | <0.02 | Au | <0.02 | Pb | <0.02 | Nd | <0.02 | K  | <0.2  | Sc | <0.02 | Ta | <0.02 | Ti | <0.02 | Zr | <0.02 |

(T) = Target analyte

**Physical Characterization:**

Homogeneity: No heterogeneity was observed in the preparation of this standard.

**Certified by:**

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
- \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- \* Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- \* All standards should be stored with caps tight and under appropriate laboratory conditions.
- \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



**CERTIFIED WEIGHT REPORT:**

Part Number: **58111** Lot # **R-1113125**  
Lot Number: **072424** Solvent: **24002546 Nitric Acid**  
Description: **Sodium (Na)**

Expiration Date: **072427** 2% 80.0 Nitric Acid (mL)

Recommended Storage: **Ambient (20 °C)**

Nominal Concentration (µg/mL): **10000**

NIST Test Number: **6UTB**

Weight shown below was diluted to (mL): **4000.2** 5E-05 Balance Uncertainty 0.10 Flask Uncertainty

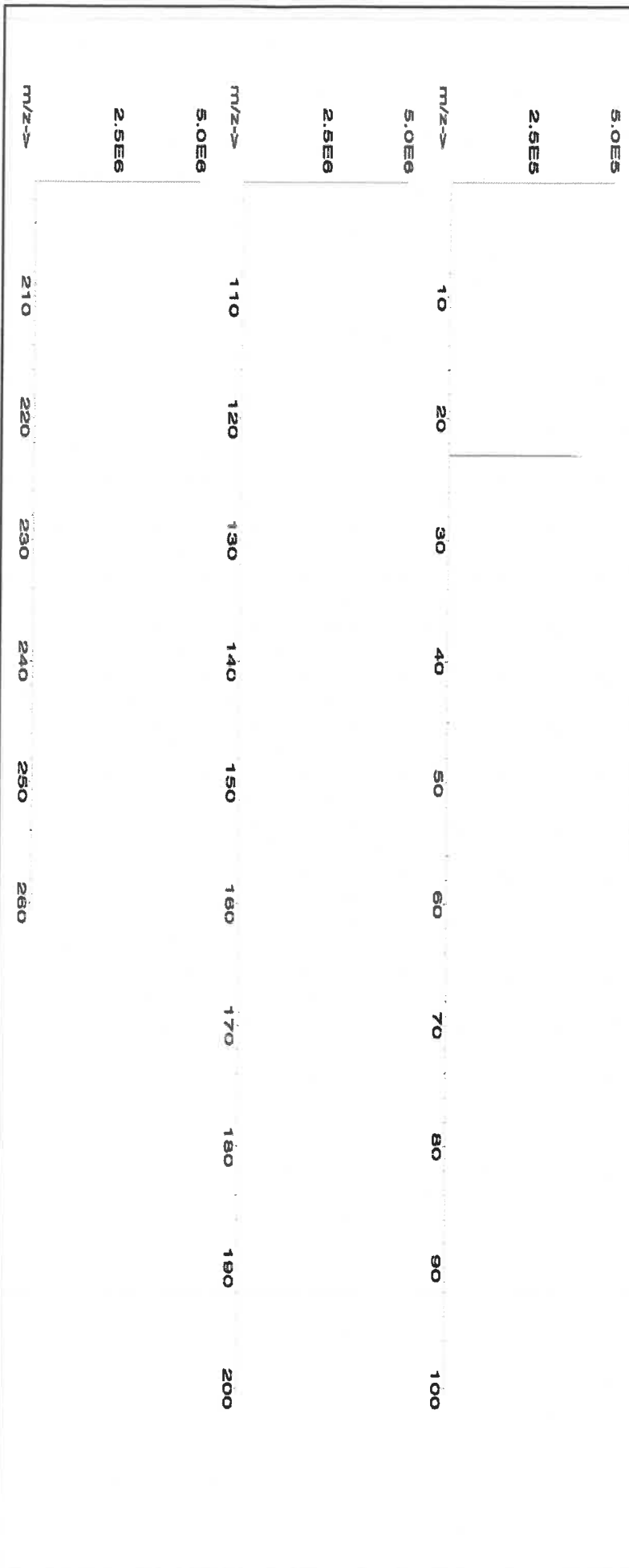
|                |                   |        |
|----------------|-------------------|--------|
| Formulated By: | Benson Chan       | 072424 |
| Reviewed By:   | Pedro L. Renteria | 072424 |

| Compound | Lot Number | Nominal Conc. (µg/mL) | Purity (%) | Uncertainty Purity (%) | Assay (%) | Target Weight (g) | Actual Weight (g) | Actual Conc. (µg/mL) | Expanded Uncertainty +/- (µg/mL) | CAS# | OSHA PEL (TWA) | LD50 | NIST SRM |
|----------|------------|-----------------------|------------|------------------------|-----------|-------------------|-------------------|----------------------|----------------------------------|------|----------------|------|----------|
|          |            |                       |            |                        |           |                   |                   |                      |                                  |      |                |      |          |

**SDS Information**

1. Sodium nitrate (Na) IN036 NAV01201511 10000 99.999 0.10 26.9 148.7096 ##### 10000.0 20.0 7631-99-4 5 mg/m3 orl-rat 3430 mg/kg 3152a

[1] Spectrum No. 1 [ 8.935 sec]: 58111.D# [Count] [Linear]





**Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):**

**Trace Metals Verification by ICP-MS (µg/mL)**

|    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |
|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|
| Al | <0.02 | Cd | <0.02 | Dy | <0.02 | Hf | <0.02 | Li | <0.02 | Ni | <0.02 | Pt | <0.02 | Se | <0.2  | Tb | <0.02 | W  | <0.02 |
| Sb | <0.02 | Ca | <0.2  | Er | <0.02 | Ho | <0.02 | Lu | <0.02 | Nb | <0.02 | Re | <0.02 | Si | <0.02 | Te | <0.02 | U  | <0.02 |
| As | <0.2  | Ce | <0.02 | Eu | <0.02 | In | <0.02 | Mg | <0.01 | Os | <0.02 | Rb | <0.02 | Ag | <0.02 | Tl | <0.02 | V  | <0.02 |
| Ba | <0.02 | Cs | <0.02 | Gd | <0.02 | Ir | <0.02 | Mn | <0.02 | Pd | <0.02 | Rb | <0.02 | Na | T     | Tb | <0.02 | Yb | <0.02 |
| Be | <0.01 | Cr | <0.02 | Ga | <0.02 | Fe | <0.2  | Hg | <0.2  | P  | <0.02 | Ru | <0.02 | Sr | <0.02 | Tm | <0.02 | Y  | <0.02 |
| Bi | <0.02 | Co | <0.02 | Ge | <0.02 | La | <0.02 | Mo | <0.02 | Pt | <0.02 | Sm | <0.02 | S  | <0.02 | Sn | <0.02 | Zn | <0.02 |
| B  | <0.02 | Cu | <0.02 | Au | <0.02 | Pb | <0.02 | Nd | <0.02 | K  | <0.2  | Sc | <0.02 | Ta | <0.02 | Ti | <0.02 | Zr | <0.02 |

(T) = Target analyte

**Physical Characterization:**

Homogeneity: No heterogeneity was observed in the preparation of this standard.

**Certified by:**

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
- \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- \* Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- \* All Standards should be stored with caps tight and under appropriate laboratory conditions.
- \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



**CERTIFIED WEIGHT REPORT:**

**Part Number:** 58111  
**Lot Number:** 122223  
**Description:** Sodium (Na)

**Solvent:** 24002546 Nitric Acid

**Lot #**

**Expiration Date:** 122226

**Recommended Storage:** Ambient (20 °C)

**Nominal Concentration (µg/mL):** 10000

**NIST Test Number:** 6UTB

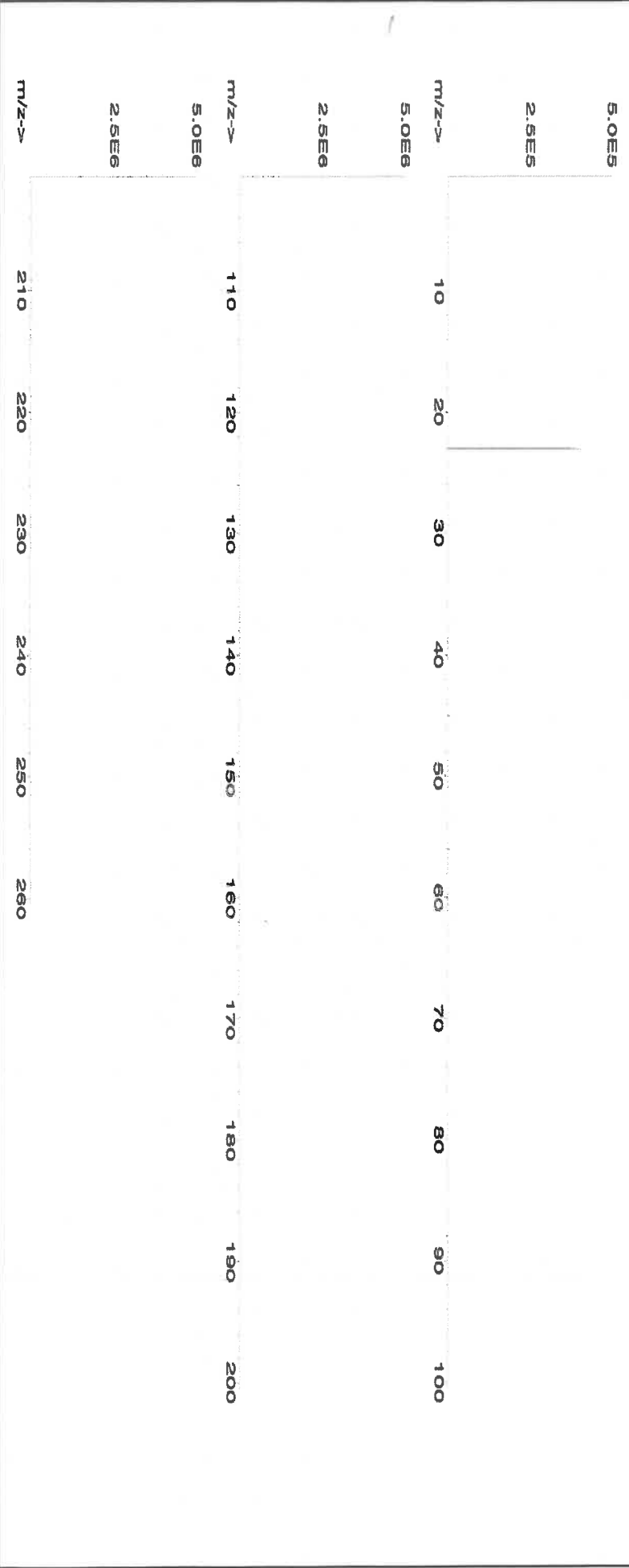
**Weight shown below was diluted to (mL):** 3000.4 0.06 Flask Uncertainty

|                      |                 |
|----------------------|-----------------|
| <i>Aleah O Brady</i> |                 |
| Formulated By:       | Aleah O Brady   |
| Reviewed By:         | Pedro L. Rentas |
|                      | 122223          |

| SDS Information                        |        |               |         |            |             |            |            |               |             |             |      |                |      |      |     |  |
|----------------------------------------|--------|---------------|---------|------------|-------------|------------|------------|---------------|-------------|-------------|------|----------------|------|------|-----|--|
| Expanded                               |        |               |         |            |             |            |            |               |             |             |      |                |      |      |     |  |
| (Solvent Safety Info. On Attached pg.) |        |               |         |            |             |            |            |               |             |             |      |                |      |      |     |  |
| Compound                               |        | Lot           | Nominal | Purity     | Uncertainty | Assay      | Target     | Actual        | Actual      | Uncertainty | CAS# | OSHA PEL (TWA) | LD50 | NIST | SRM |  |
| RM#                                    | Number | Conc. (µg/mL) | (%)     | Purity (%) | (%)         | Weight (g) | Weight (g) | Conc. (µg/mL) | +/- (µg/mL) |             |      |                |      |      |     |  |

1. Sodium nitrate (Na) IN036 NAV01201511 10000 99.999 0.10 26.9 111.5406 111.5479 10000.7 20.0 7631-99-4 5 mg/m3 or-trat 3430 mg/kg 3152a

[1] Spectrum No.1 [ 8.935 sec]:58111.D# [Count] [Linear]





**Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):**

**Trace Metals Verification by ICP-MS (µg/mL)**

|    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |
|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|
| Al | <0.02 | Cd | <0.02 | Dy | <0.02 | Li | <0.02 | Ni | <0.02 | Pt | <0.02 | Se | <0.2  | Tb | <0.02 | W  | <0.02 |
| Sb | <0.02 | Ca | <0.2  | Er | <0.02 | Lu | <0.02 | Nb | <0.02 | Re | <0.02 | Si | <0.02 | Te | <0.02 | U  | <0.02 |
| As | <0.2  | Ce | <0.02 | Eu | <0.02 | Mg | <0.01 | Os | <0.02 | Rh | <0.02 | Ag | <0.02 | Tl | <0.02 | V  | <0.02 |
| Ba | <0.02 | Cs | <0.02 | Gd | <0.02 | Mn | <0.02 | Pd | <0.02 | Rb | <0.02 | Na | <0.02 | Th | <0.02 | Yb | <0.02 |
| Be | <0.01 | Cr | <0.02 | Ga | <0.02 | Hg | <0.2  | P  | <0.02 | Ru | <0.02 | Sr | <0.02 | Tm | <0.02 | Y  | <0.02 |
| Bi | <0.02 | Co | <0.02 | Ge | <0.02 | Mo | <0.02 | Pt | <0.02 | Sm | <0.02 | S  | <0.02 | Sn | <0.02 | Zn | <0.02 |
| B  | <0.02 | Cu | <0.02 | Au | <0.02 | Nd | <0.02 | K  | <0.2  | Sc | <0.02 | Ta | <0.02 | Ti | <0.02 | Zr | <0.02 |

(T) = Target analyte

**Physical Characterization:**

Homogeneity: No heterogeneity was observed in the preparation of this standard.

**Certified by:**

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
- \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- \* Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- \* All Standards should be stored with caps tight and under appropriate laboratory conditions.
- \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).





**CERTIFIED WEIGHT REPORT:**

Part Number:  
Lot Number:  
Description:

57051  
120523  
**Antimony (Sb)**

Lot #  
Solvent:

24002546  
Nitric Acid

2.0%  
60.0  
Nitric Acid

(mL)

Expiration Date:  
Recommended Storage:

120526  
Ambient (20 °C)

Nominal Concentration (µg/mL):

1000

NIST Test Number:

6U7B

Volume shown below was diluted to (mL):

3000.41  
5E-05 Balance Uncertainty  
0.058 Flask Uncertainty

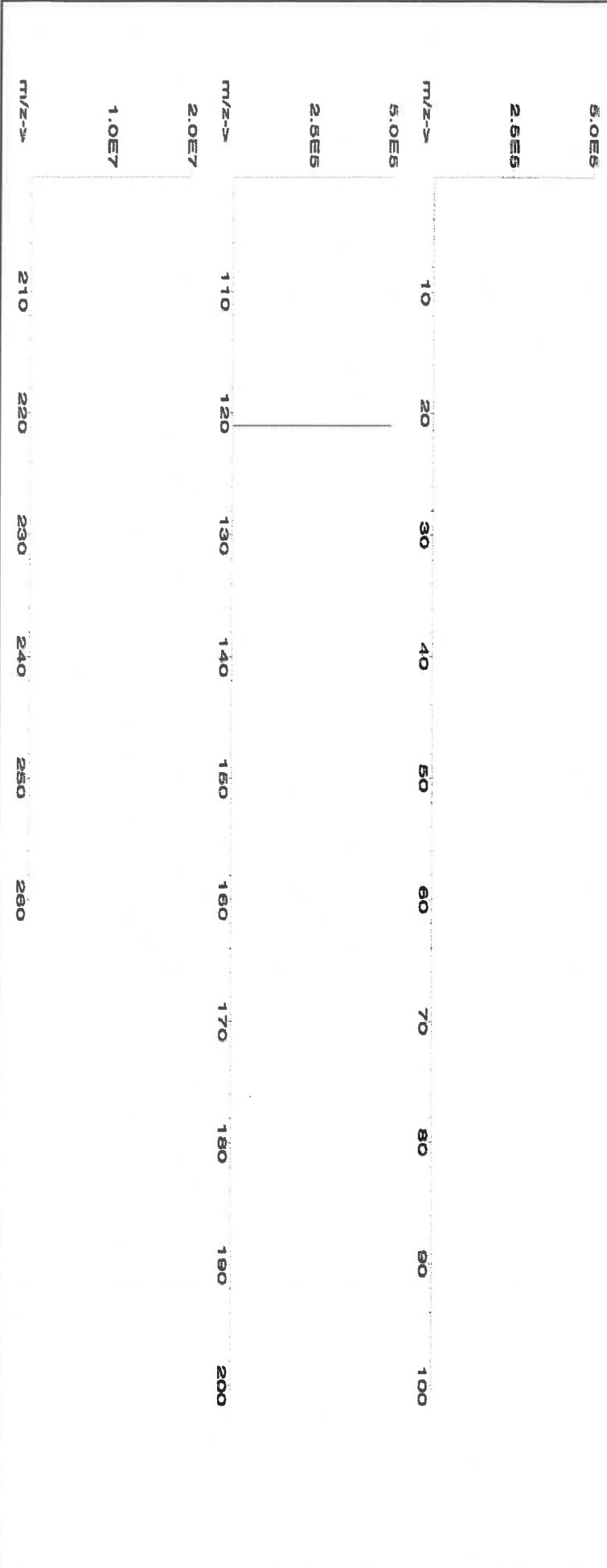
|                |                  |        |
|----------------|------------------|--------|
| Formulated By: | Lawrence Barry   | 120523 |
| Reviewed By:   | Pedro L. Rientas | 120523 |

**Compound**

| Part Number | Lot Number | Dilution Factor | Initial Vol. (mL) | Uncertainty Pipette (mL) | Nominal Conc. (µg/mL) | Initial Conc. (µg/mL) | Final Conc. (µg/mL) | Expanded Uncertainty +/- (µg/mL) | CAS# | OSHA PEL (TWA) | LD50 | NIST SRM |
|-------------|------------|-----------------|-------------------|--------------------------|-----------------------|-----------------------|---------------------|----------------------------------|------|----------------|------|----------|
|-------------|------------|-----------------|-------------------|--------------------------|-----------------------|-----------------------|---------------------|----------------------------------|------|----------------|------|----------|

1. Antimony (Sb) 58151 100923 0.1000 300.0 0.084 1000 10001.4 1000.0 2.1 7440-36-0 0.5 mg/m3 or-rel 7000 mg/kg 3102a

[1] Spectrum No.1 [ 17.964 sec]:58051.D# [Count] [Linear]





**Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):**

**Trace Metals Verification by ICP-MS (µg/mL)**

|    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |
|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|
| Al | <0.02 | Cd | <0.02 | Dy | <0.02 | Hf | <0.02 | Li | <0.02 | Ni | <0.02 | Pt | <0.02 | Se | <0.2  | Tb | <0.02 | W  | <0.02 |
| Sb | T     | Ca | <0.2  | Er | <0.02 | Ho | <0.02 | Lu | <0.02 | Nb | <0.02 | Re | <0.02 | Si | <0.02 | Te | <0.02 | U  | <0.02 |
| As | <0.2  | Ce | <0.02 | Eu | <0.02 | In | <0.02 | Mg | <0.01 | Os | <0.02 | Rh | <0.02 | Ag | <0.02 | Tl | <0.02 | V  | <0.02 |
| Ba | <0.02 | Cs | <0.02 | Gd | <0.02 | Ir | <0.02 | Mn | <0.02 | Pd | <0.02 | Rb | <0.02 | Na | <0.2  | Th | <0.02 | Yb | <0.02 |
| Be | <0.01 | Cr | <0.02 | Ga | <0.02 | Fe | <0.2  | Hg | <0.2  | P  | <0.02 | Ru | <0.02 | Sr | <0.02 | Tm | <0.02 | Y  | <0.02 |
| Bi | <0.02 | Co | <0.02 | Ge | <0.02 | La | <0.02 | Mo | <0.02 | Pt | <0.02 | Sm | <0.02 | S  | <0.02 | Sn | <0.02 | Zn | <0.02 |
| B  | <0.02 | Cu | <0.02 | Au | <0.02 | Pb | <0.02 | Nd | <0.02 | K  | <0.2  | Sc | <0.02 | Ta | <0.02 | Ti | <0.02 | Zr | <0.02 |

(T) = Target analyte

**Physical Characterization:**

Homogeneity: No heterogeneity was observed in the preparation of this standard.

**Certified by:**

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
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- \* Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
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- \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



M6030



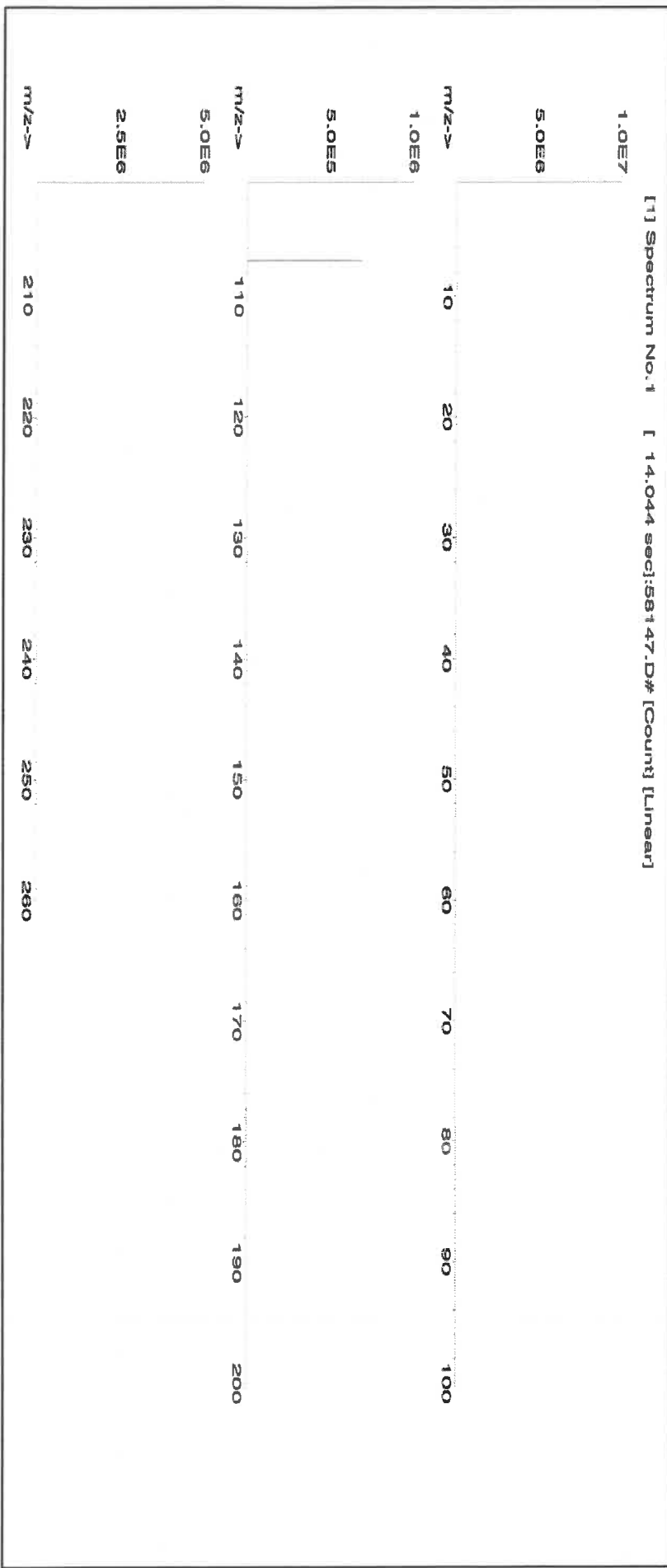
**CERTIFIED WEIGHT REPORT:**

Part Number: **57047**  
Lot Number: **122823**  
Description: **Silver (Ag)**  
Solvent: 24002546 Nitric Acid  
Lot #

Expiration Date: 122826  
Recommended Storage: Ambient (20 °C)  
Nominal Concentration (µg/mL): 1000  
NIST Test Number: 6UTB  
Weight shown below was diluted to (mL): 4000.30  
5E-05 Balance Uncertainty  
0.058 Flask Uncertainty

|                |                 |
|----------------|-----------------|
|                |                 |
| Formulated By: | Benson Chan     |
| Reviewed By:   | Pedro L. Rentas |
| 122823         |                 |

| SDS Information        |       |            |                       |            |                        |           |                   |                   |                      |
|------------------------|-------|------------|-----------------------|------------|------------------------|-----------|-------------------|-------------------|----------------------|
| Compound               | RM#   | Lot Number | Nominal Conc. (µg/mL) | Purity (%) | Uncertainty Purity (%) | Assay (%) | Target Weight (g) | Actual Weight (g) | Actual Conc. (µg/mL) |
| 1. Silver nitrate (Ag) | IN035 | J0612AGA1  | 1000.0                | 99.999     | 0.10                   | 63.7      | 6.27992           | 6.27998           | 1000.0               |
|                        |       |            |                       |            |                        |           | 2.0               | 7761-88-8         | 10 µg/mL             |
|                        |       |            |                       |            |                        |           |                   |                   | NA                   |
|                        |       |            |                       |            |                        |           |                   |                   | 3151                 |





**Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):**

**Trace Metals Verification by ICP-MS (µg/mL)**

|    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |
|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|
| Al | <0.02 | Cd | <0.02 | Dy | <0.02 | Hf | <0.02 | Li | <0.02 | Ni | <0.02 | Pt | <0.02 | Se | <0.2  | Tb | <0.02 | W  | <0.02 |
| Sb | <0.02 | Ca | <0.2  | Er | <0.02 | Ho | <0.02 | Lu | <0.02 | Nb | <0.02 | Re | <0.02 | Si | <0.02 | Te | <0.02 | U  | <0.02 |
| As | <0.2  | Ce | <0.02 | Eu | <0.02 | In | <0.02 | Mg | <0.01 | Os | <0.02 | Rh | <0.02 | Ag | T     | Tl | <0.02 | V  | <0.02 |
| Ba | <0.02 | Cs | <0.02 | Gd | <0.02 | Ir | <0.02 | Mn | <0.02 | Pd | <0.02 | Rb | <0.02 | Na | <0.2  | Th | <0.02 | Yb | <0.02 |
| Be | <0.01 | Cr | <0.02 | Ga | <0.02 | Fe | <0.2  | Hg | <0.2  | P  | <0.02 | Ru | <0.02 | Sr | <0.02 | Tm | <0.02 | Y  | <0.02 |
| Bi | <0.02 | Co | <0.02 | Ge | <0.02 | La | <0.02 | Mo | <0.02 | Pt | <0.02 | Sm | <0.02 | S  | <0.02 | Sn | <0.02 | Zn | <0.02 |
| B  | <0.02 | Cu | <0.02 | Au | <0.02 | Pb | <0.02 | Nd | <0.02 | K  | <0.2  | Sc | <0.02 | Ta | <0.02 | Ti | <0.02 | Zr | <0.02 |

(T)= Target analyte

**Physical Characterization:**

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

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R: 8/5/24

M6019

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Christiansburg, VA 24073 USA  
inorganicventures.com

P: 800-669-6799/540-585-3030  
F: 540-585-3012  
info@inorganicventures.com

## 1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



## 2.0 PRODUCT DESCRIPTION

Product Code: Single Analyte Custom Grade Solution  
Catalog Number: CGSR1  
Lot Number: U2-SR730227  
Matrix: 0.1% (v/v) HNO<sub>3</sub>  
Value / Analyte(s): 1 000 µg/mL ea:  
Strontium  
Starting Material: SrCO<sub>3</sub>  
Starting Material Lot#: M2-2192  
Starting Material Purity: 99.9993%

## 3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Value: 1001 ± 3 µg/mL  
Density: 1.000 g/mL (measured at 20 ± 4 °C)

### Assay Information:

|                        |                                                                                       |
|------------------------|---------------------------------------------------------------------------------------|
| <b>Assay Method #1</b> | <b>998 ± 4 µg/mL</b><br>ICP Assay NIST SRM Traceable to 3153a Lot Number: K2-SR650985 |
| <b>Assay Method #2</b> | <b>1001 ± 3 µg/mL</b><br>EDTA NIST SRM 928 Lot Number: 928                            |
| <b>Assay Method #3</b> | <b>1001 ± 2 µg/mL</b><br>Calculated NIST SRM Lot Number: See Sec. 4.2                 |

- The Calculated Value is a value calculated from the weight of a starting material that has been certified directly vs. a National Institute of Standards and Technology (NIST) SRM/RM. See Sec 4.2 for balance traceability.

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

## Characterization of CRM/RM by Two or More Methods

Certified Value,  $X_{CRM/RM}$ , where two or more methods of characterization are used is the weighted mean of the results:

$$X_{CRM/RM} = \sum (w_i) (X_i)$$

$X_i$  = mean of Assay Method  $i$  with standard uncertainty  $u_{char\ i}$

$w_i$  = the weighting factors for each method calculated using the inverse square of the variance:

$$w_i = (1/u_{char\ i})^2 / (\sum (1/u_{char\ i})^2)$$

$$CRM/RM \text{ Expanded Uncertainty } (k) = U_{CRM/RM} = k (u_{char}^2 + u_{bb}^2 + u_{ts}^2 + u_{ts}^2)^{1/2}$$

$k$  = coverage factor = 2

$u_{char} = [\sum (w_i)^2 (u_{char\ i})^2]^{1/2}$  where  $u_{char\ i}$  are the errors from each characterization method

$u_{bb}$  = bottle to bottle homogeneity standard uncertainty

$u_{ts}$  = long term stability standard uncertainty (storage)

$u_{ts}$  = transport stability standard uncertainty

## Characterization of CRM/RM by One Method

Certified Value,  $X_{CRM/RM}$ , where one method of characterization is used is the mean of individual results:

$$X_{CRM/RM} = (X_a) (u_{char\ a})$$

$X_a$  = mean of Assay Method  $A$  with

$u_{char\ a}$  = the standard uncertainty of characterization Method  $A$

$$CRM/RM \text{ Expanded Uncertainty } (k) = U_{CRM/RM} = k (u_{char\ a}^2 + u_{bb}^2 + u_{ts}^2 + u_{ts}^2)^{1/2}$$

$k$  = coverage factor = 2

$u_{char\ a}$  = the errors from characterization

$u_{bb}$  = bottle to bottle homogeneity standard uncertainty

$u_{ts}$  = long term stability standard uncertainty (storage)

$u_{ts}$  = transport stability standard uncertainty

## 4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

### 4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

### 4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

### 4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

## 5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

CRM/RMs are tested for trace metallic impurities by Axial ICP-OES and ICP-MS. The result from the most sensitive method for each element, is reported below. Solutions tested by ICP-MS were analyzed in an ULPA-Filtered Clean Room. An ULPA-Filter is 99.9985% efficient for the removal of particles down to 0.3 µm.

|   |    |          |          |    |          |          |          |    |          |          |          |    |    |          |          |    |          |          |
|---|----|----------|----------|----|----------|----------|----------|----|----------|----------|----------|----|----|----------|----------|----|----------|----------|
| M | Ag | <        | 0.001980 | M  | Eu       | <        | 0.000495 | O  | Na       | 0.000200 | M        | Se | <  | 0.013862 | O        | Zn | 0.000143 |          |
| O | Al | 0.000370 | O        | Fe | 0.000410 | M        | Nb       | <  | 0.000495 | i        | Si       | <  |    |          | M        | Zr | <        | 0.000495 |
| M | As | <        | 0.000495 | M  | Ga       | <        | 0.000495 | M  | Nd       | <        | 0.000495 | M  | Sm | <        | 0.000495 |    |          |          |
| M | Au | <        | 0.000989 | M  | Gd       | <        | 0.000495 | O  | Ni       | <        | 0.007631 | M  | Sn | <        | 0.000990 |    |          |          |
| M | B  | <        | 0.039606 | M  | Ge       | <        | 0.000495 | M  | Os       | <        | 0.000494 | s  | Sr | <        |          |    |          |          |
| M | Ba | 0.006486 | M        | Hf | <        | 0.000495 | i        | P  | <        |          |          | M  | Ta | <        | 0.000495 |    |          |          |
| M | Be | <        | 0.000990 | M  | Hg       | <        | 0.000989 | M  | Pb       | <        | 0.002970 | M  | Tb | <        | 0.000495 |    |          |          |
| M | Bi | <        | 0.000495 | M  | Ho       | <        | 0.000495 | M  | Pd       | <        | 0.003957 | M  | Te | <        | 0.027724 |    |          |          |
| O | Ca | 0.004255 | M        | In | <        | 0.000495 | M        | Pr | <        | 0.000495 | M        | Th | <  | 0.000990 |          |    |          |          |
| M | Cd | 0.001339 | M        | Ir | <        | 0.000494 | M        | Pt | <        | 0.002970 | M        | Ti | <  | 0.005940 |          |    |          |          |
| M | Ce | <        | 0.004950 | O  | K        | <        | 0.008184 | M  | Rb       | <        | 0.002970 | M  | Tl | <        | 0.000495 |    |          |          |
| M | Co | <        | 0.000495 | M  | La       | <        | 0.000495 | M  | Re       | <        | 0.000495 | M  | Tm | <        | 0.000495 |    |          |          |
| O | Cr | <        | 0.003207 | O  | Li       | <        | 0.000884 | O  | Rh       | <        | 0.012829 | M  | U  | <        | 0.001485 |    |          |          |
| M | Cs | <        | 0.000990 | M  | Lu       | <        | 0.002970 | M  | Ru       | <        | 0.000989 | M  | V  | <        | 0.001980 |    |          |          |
| M | Cu | 0.000099 | O        | Mg | 0.000064 | i        | S        | <  |          |          |          | M  | W  | <        | 0.003960 |    |          |          |
| M | Dy | <        | 0.000495 | O  | Mn       | 0.000066 | M        | Sb | <        | 0.014852 | O        | Y  | <  | 0.000995 |          |    |          |          |
| M | Er | <        | 0.000495 | M  | Mo       | <        | 0.001980 | M  | Sc       | <        | 0.001980 | M  | Yb | <        | 0.000495 |    |          |          |

M - Checked by ICP-MS

O - Checked by ICP-OES

i - Spectral Interference

n - Not Checked For

s - Solution Standard Element

## 6.0 INTENDED USE

6.1 This standard is intended for the calibration of analytical instruments and validation of analytical methods as appropriate. This CRM may be used in connection with EPA Methods 6010, 6020 (all versions), Standard Methods 3120 B and USP <232> / ICH Q3D.

**6.2** For products attaining traceability through Inorganic Ventures' Primary Certified Reference Materials (PCRM™) see the Limited License to Use PCRM™ in the Inorganic Ventures Terms and Conditions of Sale, <https://www.inorganicventures.com/terms-and-conditions-sale>. The Terms and Conditions contain information on the use of materials traceable to PCRM™ certified reference materials. This Limited License agreement is especially pertinent for laboratories accredited under ISO:17034.

## 7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

### 7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.
- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.
- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit [www.inorganicventures.com/TCT](http://www.inorganicventures.com/TCT)

**Atomic Weight; Valence; Coordination Number; Chemical Form in Solution** - 87.62 +2 6 Sr(H<sub>2</sub>O)<sub>6</sub>+2

**Chemical Compatibility** - Soluble in HCl, and HNO<sub>3</sub>. Avoid H<sub>2</sub>SO<sub>4</sub>, HF and neutral to basic media. Stable with most metals and inorganic anions forming insoluble silicate, carbonate, hydroxide, oxide, fluoride, sulfate, oxalate, chromate, arsenate and tungstate in neutral aqueous media.

**Stability** - 2-100 ppb levels stable for months in 1% HNO<sub>3</sub> / LDPE container. 1-10,000 ppm solutions chemically stable for years in 1 - 3.5% HNO<sub>3</sub> / LDPE container.

**Sr Containing Samples (Preparation and Solution)** -Metal (Best dissolved in diluted HNO<sub>3</sub> ); Ores (Carbonate fusion in PtO followed by HCl dissolution); Organic Matrices (Dry ash and dissolution in dilute HCl).

**Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/axial view):**

| Technique/Line     | Estimated D.L.         | Order | Interferences (underlined indicates severe) |
|--------------------|------------------------|-------|---------------------------------------------|
| ICP-MS 88 amu      | 1200 ppt               | N/A   | 72Ge16O, 176Yb+2, 176Lu+2 , 176Hf+2         |
| ICP-OES 407.771 nm | 0.0004 / 0.00006 µg/mL | 1     | U, Ce                                       |
| ICP-OES 421.552 nm | 0.0008 / 0.00004 µg/mL | 1     | Rb                                          |
| ICP-OES 460.733 nm | 0.07 / 0.003 µg/mL     | 1     | Ce                                          |

## 8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

## 9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

## 10.0 QUALITY STANDARD DOCUMENTATION

### 10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

### 10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

### 10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; [info@inorganicventures.com](mailto:info@inorganicventures.com);

## 11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

### 11.1 Certification Issue Date

March 03, 2023

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

### 11.2 Lot Expiration Date

- March 03, 2028

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

### 11.3 Period of Validity

- Sealed TCT Bag Open Date: \_\_\_\_\_

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

## 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

### Certificate Approved By:

Thomas Kozikowski  
Manager, Quality Control



### Certifying Officer:

Paul Gaines  
Chairman / Senior Technical Director







**CERTIFIED WEIGHT REPORT:**

R: 03/16/23 MS473 MS474 MS475 MS476

Lot #

Part Number:

**56138**

Solvent: 20510011

Nitric Acid

Lot Number:

**082922**

Description:

**Strontium (Sr)**

2% 20.0 (mL)

Nitric Acid

Expiration Date:

082925

Recommended Storage:

Ambient (20 °C)

Nominal Concentration (µg/mL):

**10000**

NIST Test Number:

6UTB

Weight shown below was diluted to (mL):

1000.12

5E-05 Balance Uncertainty  
0.058 Flask Uncertainty

|                |                   |
|----------------|-------------------|
|                |                   |
| Formulated By: | Lawrence Barry    |
|                | 082922            |
|                |                   |
| Reviewed By:   | Pedro L. Renteria |
|                | 082922            |

**SDS Information**

**Compound**

RM#

Lot

Number

Nominal

Purity (%)

Uncertainty (%)

Assay (%)

Target

Weight (g)

Actual

Weight (g)

Actual

Conc. (µg/mL)

Expanded

Uncertainty

CAS#

OSHA PEL (TWA)

LD50

NIST

SRM

1. Strontium nitrate (Sr)

IN017 SR2022018A1

10000

99.997

0.10

41.2

24.2756

24.2758

10000.1

20.0

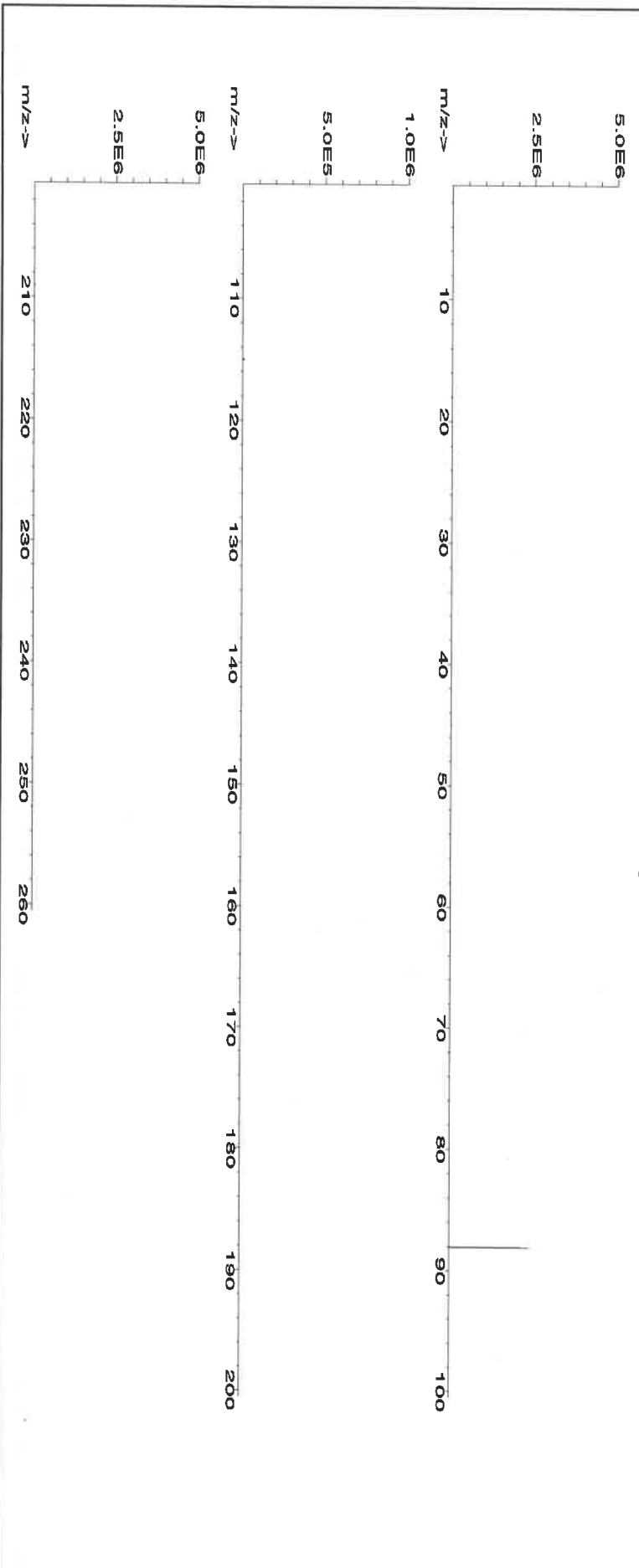
10042-76-9

NA

or-rat >2000mg/kg

3153a

[1] Spectrum No. 1 [14.495 sec]: 56138.D# [Count] [Linear]





**Instrumental Analysis by Inductively Coupled Plasma Mass Spectroscopy (ICP-MS):**

**Trace Metals Verification by ICP-MS ( $\mu\text{g/mL}$ )**

|    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |
|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|
| Al | <0.02 | Cd | <0.02 | Dy | <0.02 | Hf | <0.02 | Li | <0.02 | Ni | <0.02 | Pr | <0.02 | Se | <0.2  | Tb | <0.02 | W  | <0.02 |
| Sb | <0.02 | Ca | <0.2  | Er | <0.02 | Ho | <0.02 | Lu | <0.02 | Nb | <0.02 | Re | <0.02 | Si | <0.02 | Te | <0.02 | U  | <0.02 |
| As | <0.2  | Ce | <0.02 | Eu | <0.02 | In | <0.02 | Mg | <0.01 | Os | <0.02 | Rh | <0.02 | Ag | <0.02 | Tl | <0.02 | V  | <0.02 |
| Ba | <0.02 | Cs | <0.02 | Gd | <0.02 | Ir | <0.02 | Mn | <0.02 | Pd | <0.02 | Rb | <0.02 | Na | <0.2  | Th | <0.02 | Yb | <0.02 |
| Be | <0.01 | Cr | <0.02 | Ga | <0.02 | Fe | <0.2  | Hg | <0.2  | P  | <0.02 | Ru | <0.02 | Sr | T     | Tm | <0.02 | Y  | <0.02 |
| Bi | <0.02 | Co | <0.02 | Ge | <0.02 | La | <0.02 | Mo | <0.02 | Pt | <0.02 | Sm | <0.02 | S  | <0.02 | Sn | <0.02 | Zn | <0.02 |
| B  | <0.02 | Cu | <0.02 | Au | <0.02 | Pb | <0.02 | Nd | <0.02 | K  | <0.2  | Sc | <0.02 | Ta | <0.02 | Ti | <0.02 | Zr | <0.02 |

(T) = Target analyte

**Physical Characterization:**

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
- \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- \* Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- \* All Standards should be stored with caps tight and under appropriate laboratory conditions.
- \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



**CERTIFIED WEIGHT REPORT:**

**Part Number:** 57081  
**Lot Number:** 062724  
**Description:** Thallium (TI)

Lot #

**Solvent:** 24002546 Nitric Acid

2% 40.0 (mL) Nitric Acid

**Expiration Date:**

062727

**Recommended Storage:** Ambient (20 °C)

**Nominal Concentration (µg/mL):**

1000

**NIST Test Number:**

6UTB

**Weight shown below was diluted to (mL):** 2000.1

5E-05 Balance Uncertainty  
0.10 Flask Uncertainty

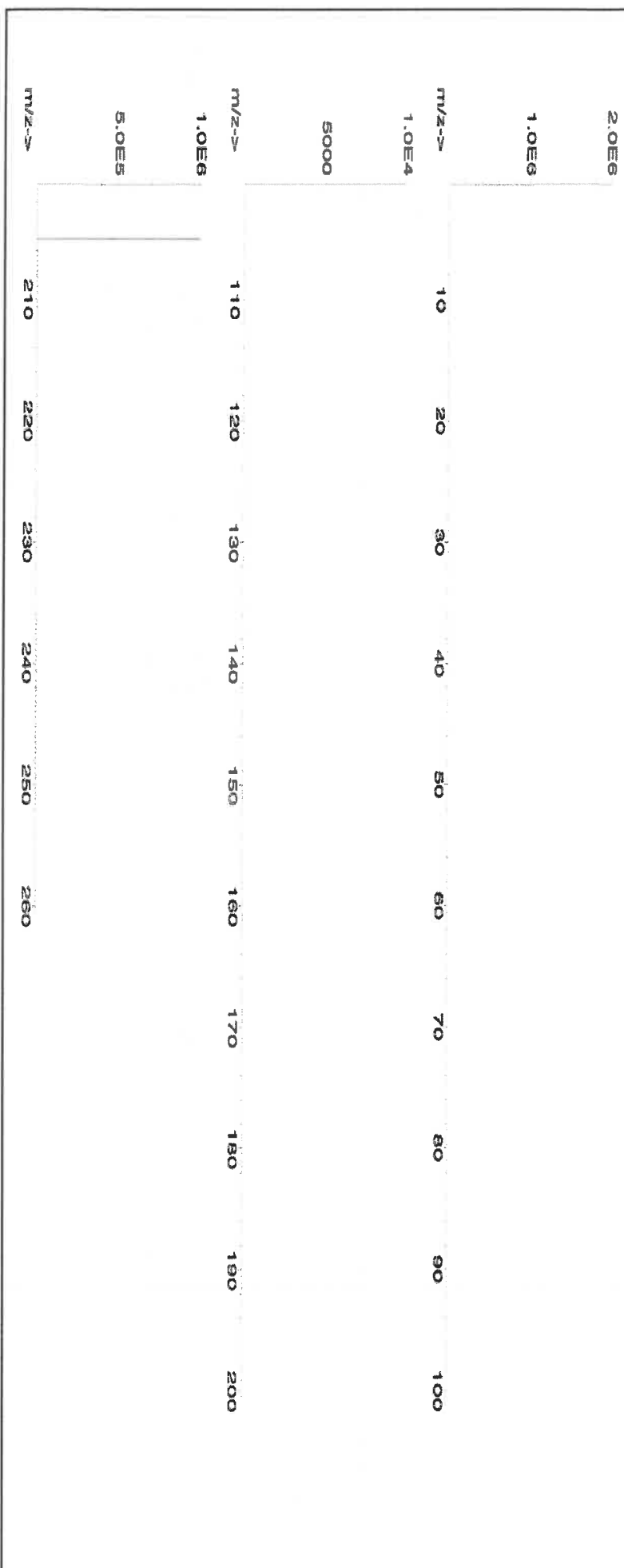
|                      |                        |
|----------------------|------------------------|
| <i>Aleah O'Brady</i> |                        |
| Formulated By:       | Aleah O'Brady          |
|                      | 062724                 |
| Reviewed By:         | <i>Pedro L. Renias</i> |
|                      | Pedro L. Renias        |
|                      | 062724                 |

**SDS Information**

| Compound | Lot Number | Nominal Conc. (µg/mL) | Purity (%) | Uncertainty (%) | Assay (%) | Target Weight (g) | Actual Weight (g) | Actual Conc. (µg/mL) | Expanded Uncertainty +/- (µg/mL) | CAS# | OSHA PEL (TWA) | LD50 | NIST SRM |
|----------|------------|-----------------------|------------|-----------------|-----------|-------------------|-------------------|----------------------|----------------------------------|------|----------------|------|----------|
|----------|------------|-----------------------|------------|-----------------|-----------|-------------------|-------------------|----------------------|----------------------------------|------|----------------|------|----------|

1. Thallium nitrate (TI) IN037 BCCF4399 1000 99.999 0.10 77.0 2.5975 2.5977 1000.1 2.0 10102-45-1 0.1 mg/m3 orl-mus 15mg/kg 3158

[1] Spectrum No.1 [ 14.044 sec]:57081.D# [Count] [Linear]





**Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):**

**Trace Metals Verification by ICP-MS (µg/mL)**

|    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |    |       |
|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|
| Al | <0.02 | Cd | <0.02 | Dy | <0.02 | Hf | <0.02 | Li | <0.02 | Ni | <0.02 | Pt | <0.02 | Sc | <0.2  | Tb | <0.02 | W  | <0.02 |
| Sb | <0.02 | Ca | <0.2  | Er | <0.02 | Ho | <0.02 | Lu | <0.02 | Nb | <0.02 | Re | <0.02 | Si | <0.02 | Te | <0.02 | U  | <0.02 |
| As | <0.2  | Ce | <0.02 | Eu | <0.02 | In | <0.02 | Mg | <0.01 | Os | <0.02 | Rh | <0.02 | Ag | <0.02 | Tl | T     | V  | <0.02 |
| Ba | <0.02 | Cs | <0.02 | Gd | <0.02 | Ir | <0.02 | Mn | <0.02 | Pd | <0.02 | Rb | <0.02 | Na | <0.2  | Tm | <0.02 | Yb | <0.02 |
| Be | <0.01 | Cr | <0.02 | Ga | <0.02 | Fe | <0.2  | Hg | <0.2  | P  | <0.02 | Ru | <0.02 | Sr | <0.02 | Sn | <0.02 | Y  | <0.02 |
| Bi | <0.02 | Co | <0.02 | Ge | <0.02 | La | <0.02 | Mo | <0.02 | Pt | <0.02 | Sm | <0.02 | S  | <0.02 | Ti | <0.02 | Zn | <0.02 |
| B  | <0.02 | Cu | <0.02 | Au | <0.02 | Pb | <0.02 | Nd | <0.02 | K  | <0.2  | Se | <0.02 | Ta | <0.02 |    |       | Zr | <0.02 |

(T) = Target analyte

**Physical Characterization:**

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- \* All standard containers are meticulously cleaned prior to use.
- \* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- \* Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- \* All Standards should be stored with caps tight and under appropriate laboratory conditions.
- \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



**Certified Reference Material CRM**

M6021



**CERTIFIED WEIGHT REPORT:**

Part Number: **57023**  
Lot Number: **062424**  
Description: **Vanadium (V)**

Lot # **24002546**  
Solvent: **Nitric Acid**

|                      |                        |
|----------------------|------------------------|
| <i>Aleah O'Brady</i> |                        |
| Formulated By:       | Aleah O'Brady          |
| Reviewed By:         | <i>Pedro L. Rentas</i> |
|                      | Pedro L. Rentas        |
|                      | 062424                 |

Expiration Date: **062427**  
Recommended Storage: **Ambient (20 °C)**  
Nominal Concentration (µg/mL): **1000**  
NIST Test Number: **6UTB**

2.0%

40.0 (mL)

Nitric Acid

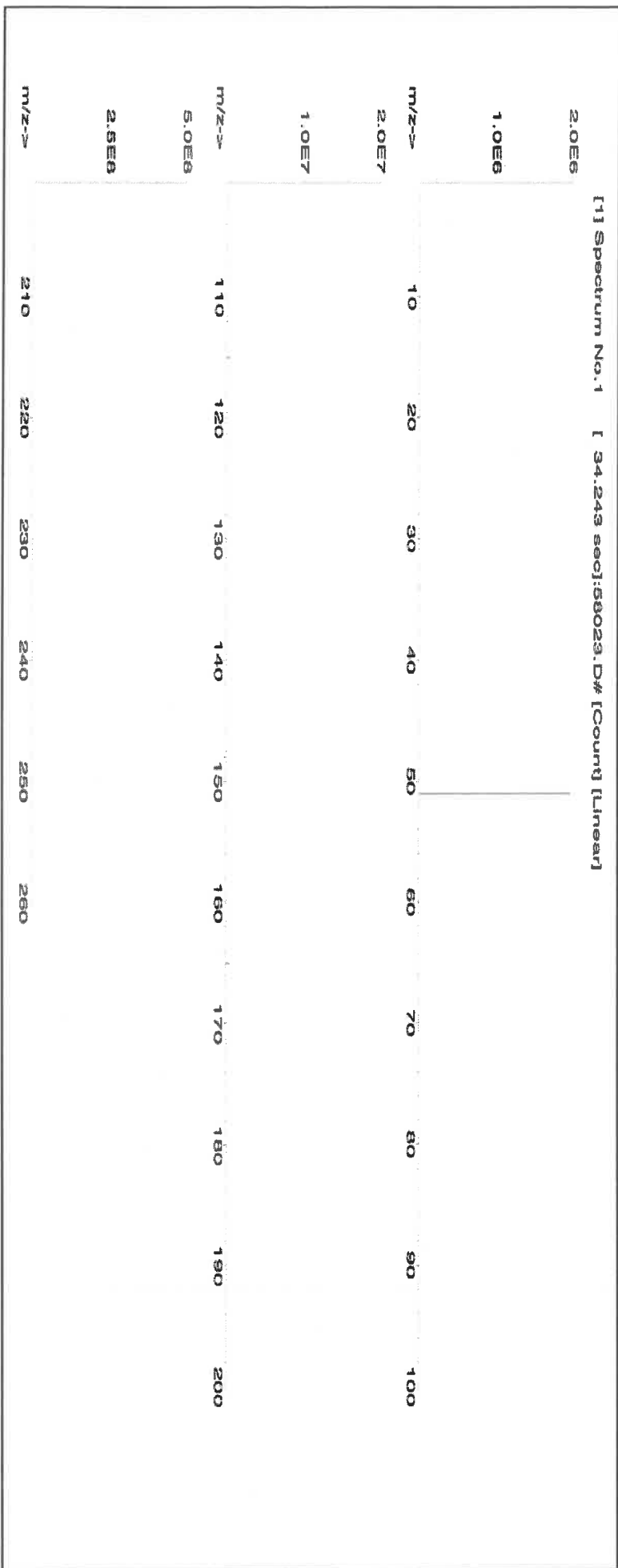
Volume shown below was diluted to (mL): **2000.3**

5E-05 Balance Uncertainty  
0.06 Flask Uncertainty

| Compound | Part Number | Lot Number | Dilution Factor | Initial Vol. (mL) | Uncertainty Pipette (mL) | Nominal Conc. (µg/mL) | Initial Conc. (µg/mL) | Final Conc. (µg/mL) | Expanded Uncertainty +/- (µg/mL) | CAS# | SDS Information (Solvent Safety Info. On Attached pg.) | NIST SRM |
|----------|-------------|------------|-----------------|-------------------|--------------------------|-----------------------|-----------------------|---------------------|----------------------------------|------|--------------------------------------------------------|----------|
|          |             |            |                 |                   |                          |                       |                       |                     |                                  |      |                                                        |          |

1. Ammonium metavanadate (V) 58123 021224 0.1000 200.0 0.084 1000 10000.3 1000.0 2.2 7803-55-6 0.05 mg/m3 or-at 58.1mg/kg 3165

[1] Spectrum No.1 [ 34.243 sec]:58023.D# [Count] [Linear]





**SOP ID :** M3050B-Digestion-20, MSFAM01.1-Trace Metals-2

**SDG No :** YE8C9

**Matrix :** SOIL

**Pipette ID:** ICP A

**Balance ID :** M SC-2

**Filter paper ID :** N/A

**pH Strip ID :** N/A

**Hood ID :** #3

**Block ID:** 1. HOT BLOCK #3 2. N/A

**Start Digest Date:** 01/28/2025 **Time :** 13:05 **Temp :** 96 °C

**End Digest Date:** 01/28/2025 **Time :** 15:10 **Temp :** 96 °C

**Digestion tube ID:** M6054

**Block thermometer ID:** MET-DIG. #3

**Dig Technician Signature:** *SKS*

**Supervisor Signature:** *[Signature]*

**Temp :** 1. 96°C 2. N/A

| Standardized Name | MLS USED | STD REF. # FROM LOG |
|-------------------|----------|---------------------|
| LCSS              | 1.00     | MP84063             |
| Spike Sol 6       | 1.00     | MP84070             |
| N/A               | N/A      | N/A                 |
| N/A               | N/A      | N/A                 |
| N/A               | N/A      | N/A                 |

| Chemical Used | ML/SAMPLE USED | Lot Number |
|---------------|----------------|------------|
| 1:1 HNO3      | 10.00          | MP84041    |
| Conc. HNO3    | 5.00           | M6126      |
| 30% H2O2      | 3.00           | M6125      |
| Conc. HCL     | 10.00          | M6121      |
| N/A           | N/A            | N/A        |
| N/A           | N/A            | N/A        |
| N/A           | N/A            | N/A        |
| N/A           | N/A            | N/A        |
| N/A           | N/A            | N/A        |
| N/A           | N/A            | N/A        |

**Extraction Conformance/Non-Conformance Comments:**

HOT BLOCK #3 CELL #35 : 96 C

| Date / Time    | Prepped Sample Relinquished By/Location | Received By/Location   |
|----------------|-----------------------------------------|------------------------|
| 01/28/25 16:10 | <i>SKS. met dig.</i>                    | <i>SA (metals lab)</i> |
|                | Preparation Group                       | Analysis Group         |

| Lab Sample ID | Client Sample ID | pH  | Initial Weight (g) | Final Vol (ml) | Color Before | Color After | Texture | Artifact | Comment | Prep Pos |
|---------------|------------------|-----|--------------------|----------------|--------------|-------------|---------|----------|---------|----------|
| PB166301BL    | PBS301           | N/A | 1.00               | 100            | Colorless    | Colorless   | Fine    | N/A      | N/A     | 1        |
| PB166301BS    | LCS301           | N/A | 1.00               | 100            | Colorless    | Colorless   | Fine    | N/A      | MP84063 | 2        |
| Q1159-01      | YE8C9            | N/A | 1.08               | 100            | Brown        | Yellow      | Medium  | N/A      | N/A     | 3        |
| Q1159-02      | YE8C9D           | N/A | 1.09               | 100            | Brown        | Yellow      | Medium  | N/A      | N/A     | 4        |
| Q1159-03      | YE8C9S           | N/A | 1.13               | 100            | Brown        | Yellow      | Medium  | N/A      | MP84070 | 5        |
| Q1159-04      | YE8D1            | N/A | 1.11               | 100            | Brown        | Yellow      | Medium  | N/A      | N/A     | 6        |
| Q1159-05      | YE8D3            | N/A | 1.21               | 100            | Black        | Yellow      | Medium  | N/A      | N/A     | 7        |
| Q1159-06      | YE8E2            | N/A | 1.37               | 100            | Brown        | Yellow      | Medium  | N/A      | N/A     | 8        |



**Instrument ID:** P4

**Daily Analysis Runlog For Sequence/QC Batch ID # LB134475**

|                  |                                                         |              |                      |
|------------------|---------------------------------------------------------|--------------|----------------------|
| Review By        | Kareem Khairalla                                        | Review On    | 1/30/2025 3:36:15 PM |
| Supervise By     | Mohan Bera                                              | Supervise On | 1/31/2025 7:33:47 AM |
| <b>STD. NAME</b> | <b>STD REF.#</b>                                        |              |                      |
| ICAL Standard    | MP84204,MP84212,MP84210,MP84209,MP84208,MP84207,MP84206 |              |                      |
| ICV Standard     | MP84213                                                 |              |                      |
| CCV Standard     | MP84216                                                 |              |                      |
| ICSA Standard    | MP84214,MP84215                                         |              |                      |
| CRI Standard     |                                                         |              |                      |
| LCS Standard     |                                                         |              |                      |
| Chk Standard     | MP84218,MP84219                                         |              |                      |

| Sr# | SampleId   | ClientID | QcType | Date           | Comment                             | Operator | Status   |
|-----|------------|----------|--------|----------------|-------------------------------------|----------|----------|
| 1   | S0         | S0       | CAL1   | 01/29/25 14:56 |                                     | Kareem   | OK       |
| 2   | S1         | S01      | CAL2   | 01/29/25 15:00 |                                     | Kareem   | OK       |
| 3   | S2         | S02      | CAL3   | 01/29/25 15:04 |                                     | Kareem   | OK       |
| 4   | S3         | S03      | CAL4   | 01/29/25 15:08 |                                     | Kareem   | OK       |
| 5   | S4         | S04      | CAL5   | 01/29/25 15:12 |                                     | Kareem   | OK       |
| 6   | S5         | S05      | CAL6   | 01/29/25 15:16 |                                     | Kareem   | OK       |
| 7   | S6         | S06      | CAL7   | 01/29/25 15:21 |                                     | Kareem   | OK       |
| 8   | ICV005     | ICV005   | ICV    | 01/29/25 15:31 | Inst. paused for calibration review | Kareem   | OK       |
| 9   | ICB005     | ICB005   | ICB    | 01/29/25 15:35 |                                     | Kareem   | OK       |
| 10  | ICSA005    | ICSA005  | ICSA   | 01/29/25 15:41 | Inst. paused for review             | Kareem   | OK       |
| 11  | ICSAB005   | ICSAB005 | ICSAB  | 01/29/25 15:45 |                                     | Kareem   | OK       |
| 12  | CCV028     | CCV028   | CCV    | 01/29/25 15:49 |                                     | Kareem   | OK       |
| 13  | CCB028     | CCB028   | CCB    | 01/29/25 15:53 |                                     | Kareem   | OK       |
| 14  | Q1136-02   | YE8F7    | SAM    | 01/29/25 15:58 |                                     | Kareem   | OK       |
| 15  | Q1136-03   | YE8F7D   | DUP    | 01/29/25 16:01 |                                     | Kareem   | OK       |
| 16  | Q1136-02L  | YE8F7L   | SD     | 01/29/25 16:05 |                                     | Kareem   | OK       |
| 17  | Q1136-04   | YE8F7S   | MS     | 01/29/25 16:09 | MS fail for Cd,Co,Pb,Ni,Ag,Tl       | Kareem   | OK       |
| 18  | Q1151-01DL | MC0AZ0   | SAM    | 01/29/25 16:13 | 20x for Cr,Co,Ni, Still Co,Ni high  | Kareem   | Dilution |

Instrument ID: P4

**Daily Analysis Runlog For Sequence/QC Batch ID # LB134475**

|                  |                                                         |              |                      |
|------------------|---------------------------------------------------------|--------------|----------------------|
| Review By        | Kareem Khairalla                                        | Review On    | 1/30/2025 3:36:15 PM |
| Supervise By     | Mohan Bera                                              | Supervise On | 1/31/2025 7:33:47 AM |
| <b>STD. NAME</b> | <b>STD REF.#</b>                                        |              |                      |
| ICAL Standard    | MP84204,MP84212,MP84210,MP84209,MP84208,MP84207,MP84206 |              |                      |
| ICV Standard     | MP84213                                                 |              |                      |
| CCV Standard     | MP84216                                                 |              |                      |
| ICSA Standard    | MP84214,MP84215                                         |              |                      |
| CRI Standard     |                                                         |              |                      |
| LCS Standard     |                                                         |              |                      |
| Chk Standard     | MP84218,MP84219                                         |              |                      |

|    |             |        |     |                |                                                                                                            |        |          |
|----|-------------|--------|-----|----------------|------------------------------------------------------------------------------------------------------------|--------|----------|
| 19 | Q1151-02DL  | MC0AZ1 | SAM | 01/29/25 16:18 | 5x for Co,Ni                                                                                               | Kareem | Confirms |
| 20 | Q1159-01    | YE8C9  | SAM | 01/29/25 16:21 |                                                                                                            | Kareem | OK       |
| 21 | Q1151-01DL2 | MC0AZ0 | SAM | 01/29/25 16:25 | 40x for Co,Ni                                                                                              | Kareem | Confirms |
| 22 | Q1159-02    | YE8C9D | DUP | 01/29/25 16:29 |                                                                                                            | Kareem | OK       |
| 23 | Q1159-01L   | YE8C9L | SD  | 01/29/25 16:33 |                                                                                                            | Kareem | OK       |
| 24 | Q1159-03    | YE8C9S | MS  | 01/29/25 16:38 |                                                                                                            | Kareem | OK       |
| 25 | Q1159-04    | YE8D1  | SAM | 01/29/25 16:42 |                                                                                                            | Kareem | OK       |
| 26 | Q1159-05    | YE8D3  | SAM | 01/29/25 16:46 |                                                                                                            | Kareem | OK       |
| 27 | Q1159-06    | YE8E2  | SAM | 01/29/25 16:50 |                                                                                                            | Kareem | OK       |
| 28 | PB166301BL  | PBS301 | MB  | 01/29/25 16:54 |                                                                                                            | Kareem | OK       |
| 29 | PB166301BS  | LCS301 | LCS | 01/29/25 16:58 |                                                                                                            | Kareem | OK       |
| 30 | CCV029      | CCV029 | CCV | 01/29/25 17:02 |                                                                                                            | Kareem | OK       |
| 31 | CCB029      | CCB029 | CCB | 01/29/25 17:06 |                                                                                                            | Kareem | OK       |
| 32 | Q1136-02A   | YE8F7A | PS  | 01/29/25 17:49 | PS for Cd,Co,Pb,Ni,Tl(0.01 ML MP84292, 0.02 ML MP84296, 0.02 ML MP84294, 0.002 ML M5961, 0.005 ML MP84293) | Kareem | OK       |
| 33 | CCV030      | CCV030 | CCV | 01/29/25 18:01 |                                                                                                            | Kareem | OK       |
| 34 | CCB030      | CCB030 | CCB | 01/29/25 18:06 |                                                                                                            | Kareem | OK       |