



# Certificate of Analysis

**ULTRAGrade™ Solution**  
**Thallium ICP / ICP-MS Standard**  
**1000 µg/mL**

**Catalog Number:** ICP-081  
**Lot Number:** CM-1100  
**Lot Issue Date:** 03/13/2015  
**Expiration Date:** 04/30/2022

**Starting Material:** thallium (I) nitrate  
**Starting Material Purity:** 99.999%  
**Starting Material Lot #:** RM07900  
**Matrix:** 2% nitric acid in low TOC water (< 50 ppb)  
**Atomic Weight TI:** 204.4

**Certified Value:** 1002 ± 2 µg/mL

This Certified Reference Material (CRM) was manufactured and verified in accordance with ULTRA's ISO 9001 registered quality system. The analyte concentration(s) were prepared and verified by an ISO Guide 34 / ISO 17025 accredited laboratory, and compared to calibration standards independently prepared using NIST SRM(s). The certified value and uncertainty value at the 95% confidence level for each analyte is determined gravimetrically.

**Classical Wet Assay Method:** Theoretical, based on gravimetric measurements

**Confirmation by Inductively Coupled Plasma Spectroscopy (ICP / ICP/MS) vs. NIST SRM 3158**

ULTRA uses purified acids, 18 megohm double deionized water, calibrated Class A glassware & meticulously cleaned bottles in the manufacturing of ULTRAGrade standards. Balances used in the manufacturing of this standard are calibrated with weights traceable to NIST in compliance with ANSI/NCSL Z-540-1 and ISO 9001.

**Trace Metallic Impurities in Solution Standard in µg/mL:**

|                |                |                |                |
|----------------|----------------|----------------|----------------|
| * Al <0.005 ND | * Ga <0.005 ND | n Nb           | n S            |
| * Sb <0.005 ND | n Ge           | n Os           | n Ta           |
| * As <0.005 ND | n Au           | * Pd <0.005 ND | n Te           |
| * Ba <0.005 ND | n Hf           | * P <0.005 ND  | n Tb           |
| * Be <0.005 ND | n Ho           | * Pt <0.005 ND | s Tl           |
| * Bi <0.005 ND | * In <0.005 ND | * K <0.005 ND  | n Th           |
| * B <0.005 ND  | n Ir           | n Pr           | n Tm           |
| * Cd <0.005 ND | * Fe <0.005 ND | n Re           | * Sn <0.005 ND |
| * Ca <0.005 ND | * La <0.005 ND | n Rh           | * Ti <0.005 ND |
| n Ce           | * Pb <0.005 D  | n Rb           | n W            |
| n Cs           | * Li <0.005 ND | n Ru           | n U            |
| * Cr <0.005 ND | n Lu           | n Sm           | * V <0.005 ND  |
| * Co <0.005 ND | * Mg <0.005 ND | n Sc           | n Yb           |
| * Cu <0.005 ND | * Mn <0.005 ND | * Se <0.005 ND | n Y            |
| n Dy           | * Hg <0.005 ND | * Si <0.005 ND | * Zn <0.005 ND |
| * Er <0.005 ND | * Mo <0.005 ND | * Ag <0.005 ND | n Zr           |
| * Eu <0.005 ND | n Nd           | * Na <0.005 ND |                |
| * Gd <0.005 ND | * Ni <0.005 ND | * Sr <0.005 ND |                |

\* - element checked for  
ND - not detected

I - spectral interference  
D - detected

n - not checked for  
s - solution standard element

**Density of Solution (measured at 19.99°C ± 0.05°C):** 1.0101 g/mL



ISO 17025:2005  
Accredited  
A2LA  
Cert. No. 0851.01

ISO 9001:2000  
Registered  
TUV USA, Inc.  
Cert. No. 06-1004

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