

# Certificate of Analysis

## Product Description:

Name: Certified Reference Material Soil Solution A  
Part Number: **CRM-SOIL-A**  
Lot Number: **SAMPLE**  
Matrix: 4% HNO<sub>3</sub>  
Purity: 99.964% - 99.999%

## Certified Values:

Element	( $\mu\text{g/mL}$ )	SRM ID	SRM Lot#	Element	( $\mu\text{g/mL}$ )	SRM ID	SRM Lot#
Al	500 $\pm$ 3	3101a	060502	Ni	0.30 $\pm$ 0.02	3136	120619
Sb	0.030 $\pm$ 0.001	*		P	10.0 $\pm$ 0.1	3139a	060717
As	0.20 $\pm$ 0.01	3103a	100818	K	200 $\pm$ 1	*	
Ba	5.00 $\pm$ 0.05	*		Se	0.010 $\pm$ 0.001	3149	100901
Cd	0.003 <sup>a</sup>	3108	130116	Si	3000 $\pm$ 30	*	
Ca	350 $\pm$ 2	3109a	050825	Na	70.0 $\pm$ 0.4	3152a	120715
Cu	0.300 $\pm$ 0.003	3114	121207	Th	0.100 $\pm$ 0.005	*	
Fe	200 $\pm$ 1	3126a	140812	U	0.010 $\pm$ 0.001	3164	080521
Pb	0.40 $\pm$ 0.02	3128	101026	V	0.100 $\pm$ 0.005	3165	992706
Mg	70.0 $\pm$ 0.4	*		Zn	1.00 $\pm$ 0.02	3168a	120629
Mn	0.100 $\pm$ 0.001	3132	050429				

<sup>a</sup> The concentration is provided for reference only.

The Certified values are based on gravimetric and volumetric preparation, and verified against SRM 3100 series developed by National Institute of Standards and Technology (NIST) via inductively coupled plasma optical emission spectrometry (ICP-OES) using an internal laboratory developed method. The uncertainty in the certified value is calculated for a 95% confidence interval and coverage factor *k* is about 2

\* Refer to Traceability Information, Section d

**Density:** 1.038 g/mL  $\pm$  0.002 g/mL @ 22.5°C

## Preparation Information:

The standard is generally prepared from single element standard solutions that are ISO Guide 34 certified reference materials. Highest purity source materials were purchased from qualified vendors per ISO 9001:2008 guidelines and assayed by ICP-OES for conformity prior to use. Sub-boiling distilled high-purity acid has been used to place the materials in solution and to stabilize the standard. The matrix is as noted above in 18 megaohm deionized water.

## Traceability Information:

The traceability of this standard is maintained through an unbroken chain of comparisons to appropriate standards with suitable procedure and measurement uncertainties. The maintenance of the base and derived

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High-Purity Standards is certified to ISO 9001:2008 and accredited to ISO/IEC 17025:2005 and ISO Guide 34:2009.

units of International System of Units (SI) with traceability of measurement results (contemporary metrology) to SI ensures their comparability over time as follows.

a. **Standard Weight and Analytical Balance**

The standard weights (NBS weights Inventory No 20231A) are calibrated every two years by South Carolina Metrology Laboratory that is a participant in "NIST Weights and Measures Measurement Assurance Program" with a certificate of measurement traceability to NIST primary standards.

The balances are calibrated yearly by the ISO 17025 accredited metrology service, and are verified weekly by an in-house method using standard weights.

b. **Volumetric Device**

The calibration of volumetric vessels is checked annually using the ASTM method E542

c. **Thermometer**

The standard thermometers are calibrated every year by the ISO 17025 accredited metrology service. The thermometers used in-house are verified against the standard thermometers yearly.

d. **Calibration Standards**

The Calibration Standards are traceable to SRM 3100 Series Spectrometric Standard Solutions or second sources.

**Packaging and Storage Conditions:**

The standard is packaged in a pre-cleaned polyethylene bottle. To maintain the integrity of this product, the solution should be kept tightly capped and stored under normal laboratory conditions.

**Refer to Material Safety Datasheet (MSDS) for hazardous information.**

**Expiration Information:**

The expiry date is guaranteed to be valid for twelve months from the shipping date provided. For this reason, standards from the same lot may have different expiration dates.

**Preparation Date:** April 29, 2015

**Shipped Date:**

**Expiration Date:**

**Certificate Issue Date:** April 30, 2015

**Quality Information:**



ISO/IEC 17025:2005 Accreditation  
Certificate Number AT-1529



**Angel Sellers**  
**Quality Manager**

NOTICE: HPS products are intended for laboratory use only. All products should be handled and used by trained professional personnel. The responsibility for the safe handling and use of these products rests solely with the buyer and/or user. The data and information as stated was furnished by the manufacturer of the product. The information provided in this certificate pertains only to the lot number specified. None of the information provided in this certificate may be used, reproduced or transmitted in any form or by any means without written approval from High Purity Standards.

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