

Soil Reference Materials ME1**Newly Developed**

100% pure soil, No Chemicals have added

Nature Soil Stored over 30~40years sample Only**Quite Stable ⇒ Very Long Expiry Date****Sulphide Content Already Stabilized ⇒ High Reliable Analysis**• **Obtain Straight Calibration Line of Wide Range****Achieve Low~High Heavy Metal content in Mountain Rock,****Sediment and Agricultural Soil****Background of Development**

The accuracy and detection limit of the analysis of heavy metals are affected by instrument, data processing error and method (Nahar et al).¹⁻⁴ XRF analysis is one of the time and cost savings process compare to conventional ICP-MS.^{3,4} The total number of portable XRF has been over 45000 all over the world at the stage of year 2010. For gaining precise results by XRF analysis **high quality soil sample for calibration line preparation is mandatory**. Soil Standard have been used worldwide for the determination of major, minor, and trace element content of soils and similar materials.

Earth Consultant and University of Toyama succeeded to develop **Newly Designed Reference Standard Materials** for heavy metals **from trace amount to high content (1 ppm – 20000 ppm)** by extending calibration line (Nahar and Marumo).³ This sample focus on determination of priority pollutant elements (e.g., **Cu, Zn, As, Cd, Pb**). **No chemicals were added to Reference Soil collected from Nature**. The combination of XRF and our New Reference Soil Samples, we can achieve Highly **Precise Analysis Results similar level as ICP-MS (Ref)**.

This works describes, in detail, the properties and application of newly developed

Elements	Characterization of Reference Standard Soil
Cu	Chalcopyrite (CuFeS ₂)
Zn	Sphalerite (ZnS)
As	Arsenopyrite (FeAsS)
Pb	Galena (PbS)
Cd	Sphalerite,(ZnS),Arsenopyrite, (FeAsS)

Experimental

New energy-dispersive X-ray fluorescence spectrometer (*University of Toyama*) has been used for the determination of heavy (Cu, Zn, As, Cd and Pb) in new Reference Materials (Fukute et al.).⁴ XRF data has been clarified by using Inductively Coupled Plasma Mass Spectrometer (*Earth Consultant Co. Ltd. Japan*, eluent: TAMAPURE AA-100, ICP-MS standard SPEX CertiPrep, 1000 mg L⁻¹, USA) procedures were performed using Standard Method (Nahar et al.).¹



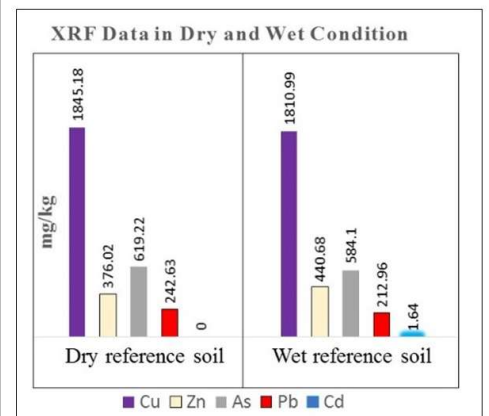
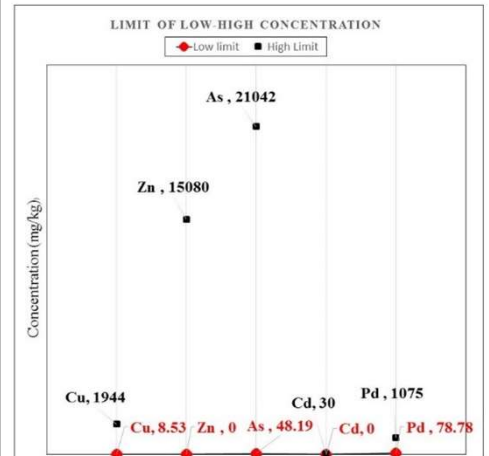
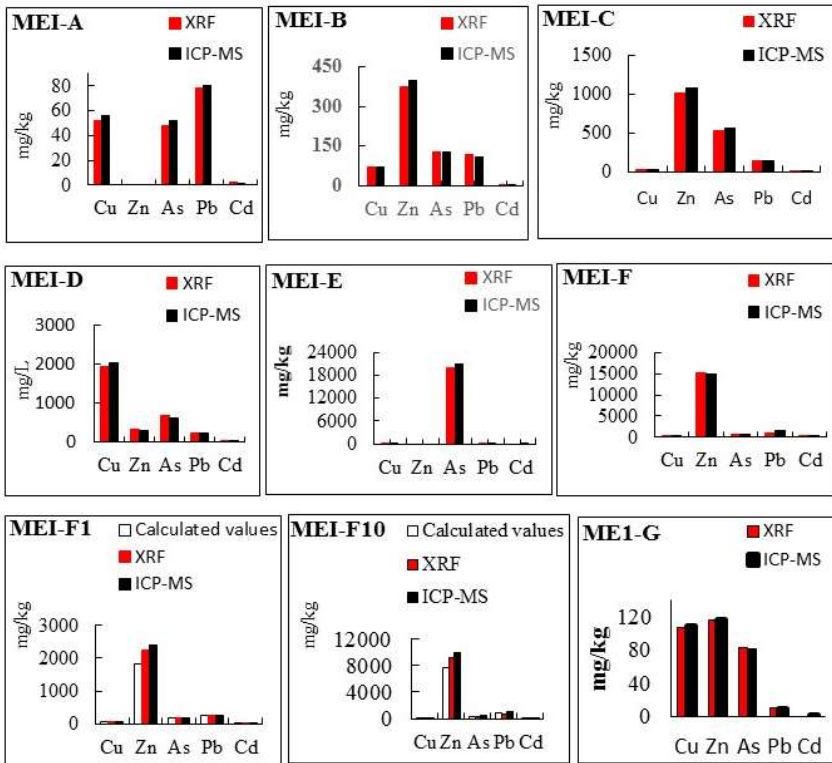
ICP-MS (AGILENT 7700)

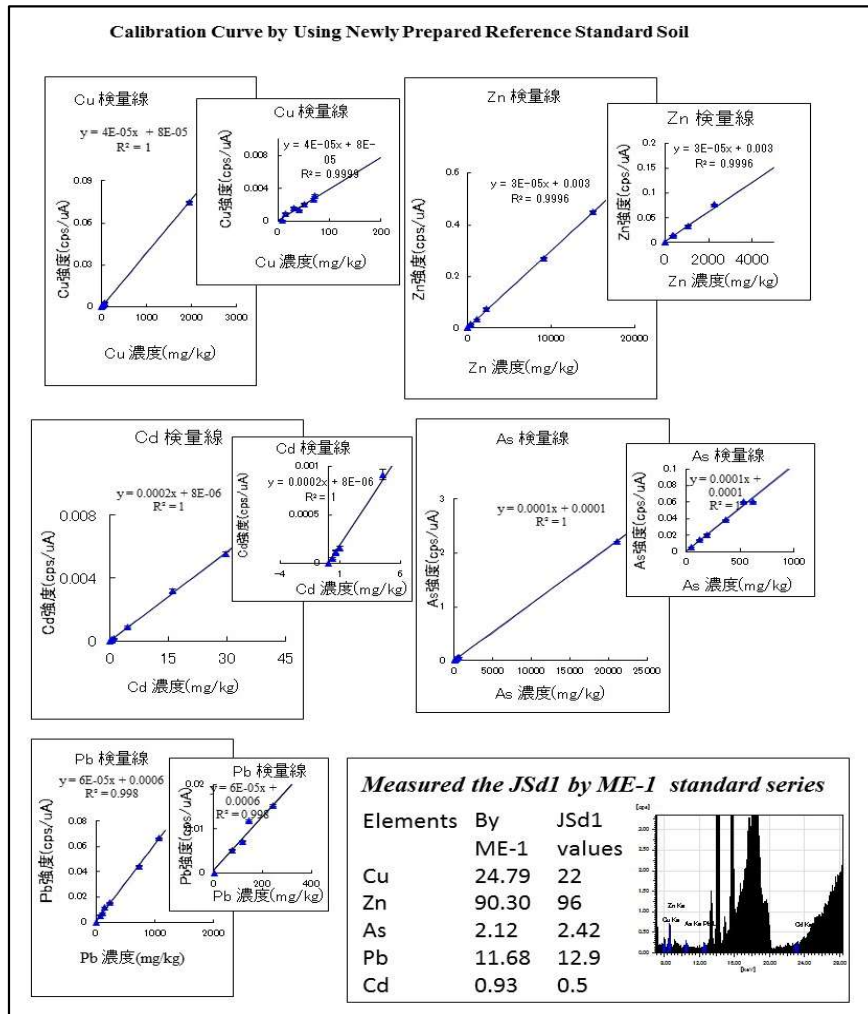


XRF (HITACHISEA1200VX)

Technical Data

Comparison the Data of Reference Standard Soil by Using ICP-MS and XRF





1. Nahar, M.S., et al 2013. ACS Sustain. Chem. Eng. 1(5):488-495.
2. Nahar M.S., 2017. Toxic. Environ. Chem.
3. Nahar M.S., et al. 2016. J. Geosci. & Environ Protec 2017, 5, 134-151.
4. Nahar M.S., Marumo, K., 2016. Water and Environment Technology Conference 27th -28th August Chuo University, Tokyo, Japan.
5. Fukute, K., Nahar M. S., Kato, K., Marumo, K., 2016. 52th X-Ray Analysis Forum 2016/10/26, Japan.

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