

## How to Use and How Not to Use Certified Reference Materials in Industrial Chemical Metrology Laboratories

John R. Sieber

Chemical Sciences Division, National Institute of Standards and Technology  
Gaithersburg, Maryland  
john.sieber@nist.gov

Working with industry labs quickly introduces one to activities of standard development organizations, who publish test methods, and accrediting bodies, who audit labs for compliance with ISO 17025 and industry specific quality system requirements. In all activities of these organizations, *viz.* analysis and testing, writing standard methods, writing accreditation requirements, and auditing labs, run the questions of how to calibrate, how to validate calibrations, how to document traceability to the International System of Units, how to express uncertainty, how to maintain statistical process control, and more. Many participants don't know what these things are, let alone the language of chemical metrology. Currently, most participants have little training in analytical chemistry, elemental analysis, and reference material development. Yet, they do not hesitate to develop and implement ever more requirements to get and to keep accreditations, which labs must have to retain their clients.

As a producer of certified reference materials (CRMs), NIST faces huge demand for Standard Reference Materials (SRMs). The demand is exacerbated by wide spread misuse of CRMs. When should one use CRMs? When should one not use CRMs? Must labs always use NIST SRMs? How can labs demonstrate analytical capabilities for their accreditation scopes? Why so many questions? It is hoped this presentation will impress on the listener the serious need for education. The presentation provides a brief background on the above problems and a look at some support and reference information provided by NIST to metals and mining industries labs, CRM producers, and accrediting bodies. The concepts and guidance apply broadly to chemical metrology and fundamental analytical chemistry. The presentation includes examples (some from XRF) to illustrate concepts.

