

Data report for elemental analysis of IMPROVE samples collected during  
JANUARY, FEBRUARY AND MARCH 2005  
UC Davis, August 7, 2006

## SUMMARY

This report provides a short summary of the quality assurance performed during and after elemental analysis of the IMPROVE samples collected during the months of January, February and March of 2005. The elemental analyses include the determination of hydrogen by Proton Elastic Scattering Analysis (PESA) and the determination of most elements with atomic numbers from 11 to 40 and 82 (Na-Zr and Pb) using an energy dispersive X-ray fluorescence systems (XRF). Two XRF systems are employed. The elements Na to Fe are reported from a system with a Cu-anode grounded X-ray tube, and the elements Ni to Zr and Pb are reported from a similar system with a Mo-anode grounded X-ray tube. Argon in ambient air interferes with the determination of some of the light elements reported from the Cu-anode system. The samples reported here are the first to be reported from an upgraded Cu-anode system that operates under vacuum and is described in Attachment 1. Samples collected in December 2004 and earlier were reported from a Cu-anode system that used helium to displace ambient air.

The following data assessments and quality controls are obtained for all analyses:

- Concentration calibration and verification
- Energy calibration
- Laboratory blanks
- Laboratory replicates (reanalysis)
- Systems comparison

In addition, the resolution of the Si(Li) [detectors in the Mo-anode XRF systems] is frequently checked using an Fe-55 source. Results indicating changes of 5% or more in the width of the K-alpha peak for Mn are reported and further investigated. [Corrected 2/9/07]

Each of these procedures is described below, along with the results obtained for the most recent tests corresponding to the actual analytical periods.

The frequent (weekly) verifications of the calibration of each system were all successful during the period of analysis of the January through March 2005 samples. Three new calibrations were performed on the XRF-Cu system to account for modifications in this new system. No new calibrations of the existing XRF-Mo system were needed.

During the analytical session for these samples the systems were performing according to their specifications (see details in sections below) and the reported data meet our QA criteria.

### **Section 1.0 General Statistics of January, February and March 2005 data**

XRF and PESA analyses were carried out on 1936 samples collected in January 2005, 1615 samples collected in February 2005 and 1777 samples collected in March 2005. All samples collected in the first quarter of 2005 were analyzed between March 28<sup>th</sup> 2005 and July 17<sup>th</sup> 2005 on the Mo-anode system and between December 22<sup>nd</sup> 2005 and April 27<sup>th</sup> 2006 on the new Cu-anode vacuum system. PESA analysis was performed in three analytical sessions: October 26<sup>th</sup> to 28<sup>th</sup> 2005, March 29<sup>th</sup> to 30<sup>th</sup> 2006 and May 24<sup>th</sup> to 26<sup>th</sup> 2006.

Table 1 summarizes the detection rates on the three systems during this analytical session. The detection rates for December 2004 are included for comparison.