**Assessment of trace metal contamination in blood collection tubes and storage containers for human biomonitoring studies** MacDonald, A.M.[1], Tiu, S.[1], Colbourne, P.[2], Lyon, A.W.[3], and Kinniburgh, D.W.[1,4]; [1]Alberta Centre for Toxicology, University of Calgary, Calgary, Alberta, Canada, [2]Department of Laboratory Medicine and Pathology, Faculty of Medicine and Dentistry, University of Alberta, Edmonton, Alberta, Canada, [3]Department of Pathology and Laboratory Medicine, University of Saskatchewan, Saskatoon, Saskatchewan, Canada, [4]Department of Physiology & Pharmacology, Cumming School of Medicine, University of Calgary, Calgary, Alberta, Canada

**Background:** Human biomonitoring requires the use of contaminant-free samples to determine levels of and trends in chemical exposure. Banked blood samples have been used for biomonitoring studies for convenience and cost savings. However, this blood is collected for other purposes such as disease screening; therefore, the tubes and supplies are not pre-screened for contamination by all chemicals of interest. Trace elements are a class of chemicals often investigated in biomonitoring studies, and contamination by some of these elements is common. The objective of this study was to investigate levels of contamination of 28 trace elements in blood collection tubes and containers typically used to store blood for clinical testing.

**Methods:** Three different lots of serum separator tubes (SSTs) were evaluated for trace element contamination (Gold, BD part number 367986), along with tubes designed for trace element testing (Royal Blue Clot Activator, BD part number 368380), tubes containing no additive (Clear, BD part number 366408), and acid-cleaned storage tubes (Diamed part number DLAU1002-4AT). Deionized water and whole blood/plasma were used to evaluate background levels of trace elements in the storage containers and collection tubes over a contact period of seven and nine days, respectively.

**Results:** The water leaching tests demonstrated detectable levels of 21 of the trace elements in at least two of three SST lots. A time trend study using whole/blood plasma found higher levels of nine elements in the SSTs than other control tubes and storage containers. The concentrations of twelve elements increased in the plasma over time. When compared to trace element concentrations in 64 maternal serum pools from the Alberta Biomonitoring Program, SST contamination was negligible for thirteen elements.

**Conclusions:** SSTs are not suitable for the analysis of some trace elements in biomonitoring studies due to high background levels, including Be, B, Al, Ti, V, Cr, Mn, Co, Ni, Zn, Sb, Ba, W, Pb, and U. SSTs may be used for the analysis of other trace elements in biomonitoring studies, such as Mg, Fe, Cu, As, Se, Sr, Mo, Ag, Cd, Cs, Pt, Hg, and Tl.

**Key Words:** biomonitoring, serum separator tubes (SSTs), trace elements, background contamination