The bioavailability and toxicity of Cu in soils is controlled by a number of soil properties and processes. Some of these such as pH, adsorption/desorption and competition with beneficial cations have been extensively studied. However, the effects of natural attenuation (or aging) on Cu availability have not been thoroughly investigated. This process is important in terms of risk assessment for Cu added to soil,
and should be distinguished from the process of Cu adsorption. We investigated the effect of aging on Cu availability in 19 European soils covering the major soil types found in Europe. These soils were spiked with Cu at two levels, incubated outdoors and sampled several times during a period of one year. Natural attenuation of Cu was investigated using an isotopic dilution technique (E value), which measures the lability or chemical reactivity of metals in soil. Lability of Cu rapidly decreased after spiking especially in high pH soils, probably due to precipitation reactions. After this rapid initial reaction phase, metal aging continued at a slower rate. Soil pH and organic matter content were the principal
parameters controlling the rate of aging. A semi-mechanistic model of aging in soil was developed and
validated using field collected contaminated soils. In addition, Extended X-Ray Absorption Fine Structure
(EXAFS) studies were coupled with isotopic dilution data to gain a mechanistic understanding of the aging process at a molecular level. Soils and pure mineral/solid phases (charcoal, goethite and montmorillonite) were equilibrated with Cu for up to 6 months. Cu lability and EXAFS spectra indicated that aging processes occur much faster in pure phases than in soils and that the aging mechanisms were different for goethite and montmorillonite in comparison to charcoal.