Au and Ag speciation in vertical profile of tailing's desperation train.

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The Ursk tailing located in the northern Salair Ridge (Russia) was mined for more 80 years and stores wastes of pyritic primary ore and ore from the Au-bearing weathering profile. Acid mine drainage with Au (0.2-1.2 ppb) and Ag (0.01-0.3 ppb) contents and unfixed wastes influence to natural swampy peat ravine located below them. Enriched zones (ppm: up to 155 Au, up to 560 Ag) were formed due to Au and Ag reprecipitation [1]. Au and Ag watersoluble, oxidizable, reducible and residual species in 43 cm vertical profile taken in the wetland desperation train using sequential extraction was studied. Profile consist of the weathering profile wastes with peat layers. Au and Ag were determined by ETAAS (Solar M6, Thermo Electron). Mineralogical composition was studied by SEM (MIRA 3 LMU, Tescan).

Au and Ag in profile are in the range 0.1-10 ppm and 2.7-8.7 ppm respectively with dominating in peat. The data is comparable to the contents calculated by the sum of leaching forms. The Au^0 particles wasn't found in the enriched peat layers. We believe that Au enters in the structure of newly formed sulfides widely found here as impurities: Zn sulphides (sphalerite group), Hg selenides (tiemmanite) and complex sulfides of Zn and Hg with impurities of As, Pb, Cu, Ag, I, forming a thin coalescence. *Watersoluble* Au dominates in peat (0.035-0.042 ppm) rather than in waste (0.002-0.02 ppm) giving 1-4% of total content. *Oxidized* Au is (ppm): 0.1-0.63 (waste) and 0.06-1.6 (peat) giving 0.6-40% of total, showing the relationship of Au with newly formed sulfides and organic matter. *Reducible* Au (ppm: 0.01-1.4 for wastes; 0.3-0.9 for peat) indicates the sorption by Fe(III) compounds, occurring due to Au-thiocomplex destruction, followed by precipitation. *Residual* Au (ppm: 0.04-1.3 (waste); 6.5-10.3 (peat)) is as native. More likely, the reason of its dominance in this step is caused by reprecipitation during leaching. Ag presents in all forms and is prevalent in reducible fraction (90%) since it is an isomorphic impurity in ASP minerals.

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[1] Myagkaya, I.N., et al., *J. of Geochem. Explor.* (2016) 165, 8-22.