Geophysical Research Abstracts,
Vol. 10, EGU2008-A-11832, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-11832
EGU General Assembly 2008

Geoenvironmental Characterization of Chromite Ore Processing Residue (COPR): Implications for Cr (VI) Treatment.

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The geoenvironmental characterization of COPR at two deposition sites (New Jersey and Maryland, USA) included geotechnical, chemical, mineralogical and leaching analyses of three main COPR types (grey black (GB), hard brown (HB), clayey (C)). Quantitative mineralogical analyses were instrumental in the delineation of the geochemical differences between the three COPR types, which enabled a framework to predict COPR response to potential remediation schemes. Overall, COPR mineralogy resembled cement, with hydration and pozzolanic reactions dominating its geochemistry. GB COPR was found to be in a largely unreacted state despite its prolonged exposure to humid conditions, while HB COPR was completely hydrated and contained high Cr(VI) concentrations. The two materials were chemically similar, with dilution accounting for the chemical and density differences. It is concluded that the two COPR types were derived from the same ore and process, and that post-depositional transformations account for the emergence of HB layers in COPR sites. What also emerged from the characterization effort was that subsequent remedial challenges associated with GB COPR would likely involve the apparent kinetic inhibition of transformation reactions, while the cementation and Cr(VI) accumulation were the main concerns for

HB COPR. C COPR was found to be a site-specific feature, comprised of GB COPR diluted by high Ca-bearing minerals.