

LIME AND PEAT TREATMENT OF OXIDIZING SULFIDIC SOILS TO MINIMIZE ACIDIFICATION AND METAL RELEASE

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Abstract

Marine sulfide-bearing sediments along the coastal line of western Finland and eastern Sweden contain considerable amounts of easily mobilizable toxic trace elements. Dredging these sediments and their subsequent oxidation in the open air could cause a release of sulfuric acid and high concentrations of toxic metals into biota, surface, groundwater, etc. Both in Finland and Sweden, there are documents that regulate the rules for handling acidic soils to reduce their negative effect on the environment. To test the effectiveness of already existing rules used in both countries, as well as newly proposed methods, a long incubation experiment on sulfide-rich sediment from the Laihianjoki river, Finland was carried out. Samples that were not subjected to treatment were used as reference samples. In total, 5 types of treatments were tested in the experiment. Lime was used as a treatment in different proportions, grain sizes, and quality from different manufacturers, moreover, peat was also added in one of the treatments. It was made to test how treatments of sulfidic spoils will affect the development of pH and metal release in the spoils. The incubation experiment has been run for more than two years from December 2019 to May 2022 and during this period drainage waters were collected regularly and analyzed for pH, Eh, Fe, acidity, anions, and metals. Also, the solid phase was collected and analyzed. From the results of pH, Eh, acidity, and elemental analysis measurements for waters and soils, all studied treatments can be divided into three groups: acidic (reference samples), semi-acidic (Finnish rules), and neutral-alkaline (Swedish recommendation and newly proposed treatments). It is possible to assess the inconsistency of the Finnish rules, which are as close as possible in terms of results to control samples. In connection with the Swedish recommendation and additional new proposed treatments should be considered more precisely.

Keywords: sulfidic sediments, acidification, oxidation, treatments