

Pollution potential of beneficial uses of bottom coal ash (e.g., road bases, structural fills, and agriculture)-Abstract

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Fly ash and bottom ash are the main Coal Combustion Byproducts (CCB). CCB make ~10-20% of the burning coal. Bottom ash makes ~15% of the CCB. In order to evaluate the pollution potential of bottom ash regarding groundwater and atmosphere, major and trace elements were measured in fly ash and bottom ash. The radioactive concentration in bottom ash has been measured, and found to be negligible.

The results shown no significant differences in the major element constituents of fly and bottom ash. The concentration of the refractory trace elements was similar in the fly and bottom ash (mainly Ba, Cr, Mn, V), because most of these elements are not volatile and therefore remain in the ashes, when the increase in their concentration in the ashes results from the burning of most of the organic fraction in the coal. The volatile trace elements (mainly As, Hg, Mo, Pb, Se, Zn) concentration was higher in the fly ash than in the bottom ash, because of their precipitation on the surface of the fly ash particles in the cooler upper regions of the boiler. All concentrations of trace elements in bottom ash were similar or lower comparing to those of the most common sedimentary rocks in Israel.

Leaching tests were made in order to determine the migration potential of ions from the bottom ash into the environment and the equifer. The concentration of trace elements in bottom ash leachate were lower than drinking water limit values, with the exception of boron. Therefore, there is no chemical pollution danger (leaching of toxic elements to the groundwater) derived from the utilization of bottom ash in road bases or structural fills, but only for the short run (one to three years). Beyond that, there might be a problem with boron for the irrigation water.

For the evaluation of atmospheric pollution by crystalline silica dust originate from bottom ash dust, as a use of crops bed, quartz concentration was measured in such bottom ash dust in different size fractions. It is shown that quartz concentration

decreased with increasing the size fraction, and is negligible (<0.1%) in the respiration fraction (<10 μ m).

In summary, characterization tests carried out on bottom ash showed that it belongs to the "inert waste" class as defined by the Council Working Party of Environment of the European Communities. It causes no further environmental problems, has negligible radioactivity, and causes practically no atmospheric and groundwater pollution .