

Chromium Leaching Potential of Trace Elements from Coal Ash to the (Groundwater) Aquifer In Israel

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Coal combustion in Israeli power plants produces more than 1,000,000 tonnes of ash annually. Most of the ash (60%) is used as cement additive. Since the expansion of coal combustion is much faster than the development of cement production, large amounts of fly ash are expected to accumulate in the next decade. Thus the environmental problem may be exacerbated if other means of utilization (e.g. embankments and marine reclamation or utilization as a chemical reagent) will not be possible in the future.

Unlike other countries overseas, coal ash is defined in Israel as hazardous material, thus any disposal or utilization scheme requires a special permit. The main concern is that pollution from the ash will leach out and contaminate the proximal ground water. The leaching behaviour of South-African and Colombian fly ashes (the most abundant in Israel) using

- a. The improved EPA-TCLP 1311 method (used in the US).
- b. The EU-CEN/TC292/WG2 (declared recently as the method in the European Community).
- c. The NVN2508 method.

The first two methods are batch methods and the third a flow through column method.

The main constituents of the ash are SiO_2 - 40-56%, Al_2O_3 - 20-33%, Fe, Ca, Na, K, Ti, Mn, Sr 0.1-1% and also Co, Cu, B, V, Ba, Cd, Cr, Mo, Ni, Zn, Ag, As, Be, Hg, Pb, Se (up to 100 ppm). Due to the low concentration of sulfur in the coal the ashes reaction in water is very basic (up to pH 13 when no acidic solutions are used).

We have also decided to check the effects of liquid to solid ratio L/S, leaching time and temperature on the concentration of the leachates. It has been observed that no appreciable amounts of most trace elements are dissolved from the ash except that of chromium which exceeds the drinking water limits. Furthermore most of the leached chromium is in the hexavalent form which is defined as a carcinogenic reagent.

The effect of different parameters and the risk involved in leaching out of trace elements from the fly ash to the underground water aquifer will be discussed in detail.

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