

## **Israeli coal ash characterization**

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### **Abstract**

To support wide scale utilization of coal ash produced in Israel, particularly in open "unbound" applications like agriculture, the Israel Electric Corporation has collected for more than twenty years data necessary for the chemical characterization of coal ash, focusing on the components that may affect the soil and water environment. In Israeli power stations, only bituminous coal is burnt, so the ash chemical composition fits that of class F fly ash according to the ASTM system (pozzolanic fly ash). With regard to major elements, fly ash contains mainly oxides of silica, aluminium and iron, which together form more than 90% of the ash weight. For part of the coal sources, the calcium content can be also significant. The mineralogy of Israeli coal ash is characterized by a dominant amorphous alumino-silicate phase (glass) and lower amounts of crystalline phases (mullite and quartz). The ash alumino-silicate matrix is insoluble in water, thus the water pollution potential depend mainly on pH and the release of trace elements from the ash particles.

For characterizing coal ash produced both coal-fired power stations operated in Israel, the Israel Electric Corporation conducts a follow-up of the concentrations of sixteen trace elements and three radionuclides in representative samples of coal, fly ash and bottom ash, collected every six months. Since 1998, this quality monitoring includes the analysis of trace elements in leachates obtained by the Toxicity Characteristic Leaching Procedure – TCLP. The monitoring data show that the trace elements concentrations in coal ash are low, and even fit the concentration ranges characteristic for unpolluted soils (except boron). In view of the TCLP results fly ash produced conform continuously to the criteria defining the ash as "utilizable". More recently the low water pollution potential of Israeli fly ash was confirmed using the EN-12457/2 leaching test, used in the European Union for characterizing the environmental risk of wastes.

With regard to radioactivity, the monitoring data show that the radionuclides concentrations in Israeli coal ash are low and similar with those reported for coal ash produced in European countries. Studies conducted in Israel confirmed that in these conditions, there is no significant radiological risk from the utilization of coal ash in the building industry as well in other applications like agriculture.