

# Time-related Changes in Coal Ash in Two Embankments and a Roadbase

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## ABSTRACT

Two embankments built from coal ash in the Hadera power plant were sampled. The first, the northern, is some 10m high and the second, the southern, is some 20m high. The sampling was carried out some 15 years after the northern embankment was built and some three years after the southern one was erected. The embankments in Hadera were covered with a thin layer of red sandy soil (Hamra) and were irrigated. Coal ash was also sampled from a road (Jasr-el-Zarka) in which it was used as roadbase. The sampling was done some two years after the road was built.

The most noticeable change in the ash is the absorption of water; the water content may reach up to 30% of the sample. This change was detected in all the samples. Another change was found when measuring the pH. The original pH of Hadera's ash is alkaline ~ 12, because of the presence of some lime (free CaO) which in contact with water immediately becomes hydrated to portlandite,  $\text{Ca(OH)}_2$ . The pH of the samples from the southern embankment in Hadera and from Jasr-el-Zarka is ~ 9. Portlandite is very soluble and very reactive; therefore it is either leached out or recarbonated to calcite,  $\text{CaCO}_3$ , after contact with  $\text{CO}_2$ . Indeed calcite was detected in all these samples. In the southern embankment, no calcite was detected (except for one sample) and there the pH found was ~ 8.3.

In both embankments at Hadera, the ash is mixed with the soil at the top, and with the bedrock at the bottom. In the southern embankment, the rest of the section may be divided into two. The upper part is relatively depleted in most trace elements while the lower one is enriched, hinting at leaching in the upper part and absorption in the lower part.