

Title: Effects of Moisture and Storage Duration on Coal Quality and Ash Mineral Composition of Coal from Mae Moh Mine, Lampang Province

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ABSTRACT

This study investigates the influence of moisture content and storage duration on the quality and mineralogical stability of coal from the Mae Moh Mine, Thailand. Five coal seam samples (K1, K2, K3, Q1+Q2, and Q3+Q4) were monitored over a 30-day period under two experimental conditions: watered stockpiles and unwatered (dry) stockpiles. The evaluation integrated proximate analysis with X-ray diffraction (XRD) to characterize the degradation processes.

The results indicate that prolonged storage induces significant chemical weathering and leaching, particularly in watered samples. Proximate analysis revealed a progressive increase in relative ash content and moisture, accompanied by a decline in fixed carbon and volatile matter due to low-temperature oxidation. XRD analysis confirmed a dramatic mineralogical simplification over time; initial mineral assemblages including kaolinite, montmorillonite, and carbonates (calcite, dolomite) were gradually depleted. This loss is attributed to the oxidation of pyrite (FeS_2) which generates acidic conditions, subsequently accelerating the dissolution and leaching of sensitive mineral phases.

Comparative analysis showed that while watering effectively mitigates spontaneous combustion, it acts as a catalyst for chemical weathering, leading to higher moisture retention and more rapid mineral loss compared to unwatered stockpiles. In unwatered conditions, although leaching is minimized, coal quality

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still deteriorates through steady oxidation. The study concludes that the optimal storage duration is between 7 and 14 days, as storage beyond 15 days results in critical quality loss and significant mineralogical shifts that may impact combustion efficiency and ash management in power plants.

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