

Evaluation of Acid Rock Drainage Potential in Thar Block-II and Mitigation/Regulation of Acid Generation, Thar Block II, Pakistan

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Summary

Acid Rock Drainage (ARD – also known as Acid Mine Drainage – AMD) describes the formation of acid when sulfide bearing mine wastes (principally pyrite) are exposed to oxidizing conditions, typically in the presence of water, due to groundwater, rain and run-off. Stratigraphically, Thar region is mainly divided into 03 sedimentary formations which are overlaid on granitic igneous body. Thar coal deposit which is of low rank lignite grade is found in various coal seams within the oldest sedimentary formation (Bara – Eocene/Pliocene). As it is widely known that the major source of sulfur in coal deposits is due to the presence of pyrite minerals which is the main contributing factor in acid generation and spontaneous combustion. Acid Rock Drainage possesses major environmental risk in Thar Coal Mine (Block II) as generated acidic water from pyrite may seep downward and contaminate dune sand aquifer which is main source of domestic water utilization in Thar. This study aims to evaluate the Acid Rock Drainage Potential of Thar coal deposit along with the mitigating and controlling methods of acid generation from lignite coal mining operations at Thar Block II. The Acid Generation Potential testing carried out on the samples collected from all 03 sedimentary formations i.e. Bara - coal bearing (oldest), sub-recent and dune sand (youngest) reveals that coal and carbonaceous claystone layers from bara formation are potential acid forming and are prone to acid rock drainage. Meanwhile, waste layers from dune sand and sub-recent formation are classified as non-acid forming rocks. Samples were also tested for Acid Neutralizing Capacity in order to assess if any material type has the tendency to neutralize acid so that it can be used as a foundation/seal layer or shall be sequentially dumped with PAF (Potential Acid Forming) rocks. Acid neutralizing capacity results indicate that dune sand formation and sand lens from sub-recent formation has moderate to strong acid neutralization capacity.

