Drill Cutting Waste Utilization as Alternative Material for Road Application

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Abstract

Drill cuttings contaminated with synthetic based mud is considered as a potential environmental risk for onshore drilling operation in Thailand. With the current drilling waste management practice, these drill cuttings are sent for incineration at a cement kiln plant. This study focuses on evaluating potential utilization of drill cuttings, treating drill cuttings as resource instead of waste, in road application.

Potential use of the drill cutting contaminated with synthetic based mud as fine aggregate replacement in hot-mix asphalt concrete was investigated. Physical and chemical analyses were performed on the drill cuttings for grain size distribution and for presence of heavy metal. The drill cuttings were blended with aggregate for hot mixed asphalt at different percentage. The Marshall stability tests were performed using ASTM D6927 to evaluate strength of the hot mix asphalt produced with the drill cuttings incorporated. The evaluated mix properties were stability, flow, bulk specific gravity, air voids, voids in mineral aggregate and voids filled with asphalt. The Marshall stability test results indicated that hot mix asphalt produced with the drill cutting incorporated can met criteria for hot mix asphalt concrete in according to Thailand's rural road and highway specifications. The optimum percentage of drill cutting is 10% based on the total weight of the aggregate in the hot mix asphalt. Results from chemical analysis indicated that the concentration of heavy metal in the drill cuttings did not exceed the maximum contaminant levels set by Thailand's regulation. Volatile organic compounds may be emitted from stack of asphalt plant during the production of hot mix asphalt concrete. Therefore, monitoring and analysis of air quality should be performed.

Drill cutting contaminated with synthetic based mud can be used in aggregate for hot mix asphalt concrete. This process offers cost effective and environmentally sound recycling method for drill cutting waste management.