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Analysis of technological possibilities of increasing quality of oil shale

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The minable Estonian oil shale beds include various thicknesses of organic-rich shale layers with limestone-rich interlayers. The mineral components of organic-rich oil shale layers are limestone and heavy minerals (mostly pyrite) concretions. The basic quality parameter of oil shale is the heating value of its wet substance and grain-size range. Oil shale can be separated from limestone via an enrichment process that includes dry screening, coarse concentration, wet screening, fine concentrating, dewatering, and production trimming. During the process of wet screening, the slurry with inclusions of fine grain qualitative oil shale is usually transported to a waste pond. The purpose of this study is to assess separation techniques for recovering the qualitative oil shale from slurry. Experimental tests of pilot equipment for an enrichment facility at an Estonian mine were conducted. Hydrocyclones for separation of coarse and fine particles with various properties was incorporated into the wet screening process. The heating value and ash content of the material recovered from the hydrocyclone feed was used to set –accept/-reject criteria. We found that using hydrocyclones allows for separation of qualitative oil shale from slurry and recovery of about 1% of previously lost high heating value material. These experimental results allow for material balance calculations to determine the necessary size and number of hydrocyclones needed to recover the qualitative oil shale on a larger scale. Analysis of the technological potential for using hydrocyclones to sort coarse and fine particles indicates this could be a practical way of improving the efficiency of Estonian processing facilities, however additional dewatering of the recovered oil shale would be required.