



## **Can we use fibre optics to monitor moisture in waste rock?**

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Waste rock pile design influences the downward movement of fluids within the structure and may promote the production of contaminated leachate. New waste rock pile designs have been developed to incorporate inclined covers made of fine grained, non-reactive waste rock in target to induce a moisture barrier. Such system creates a capillary break which could directs water away from the waste rock pile interior.

We apply active fibre optic distributed temperature sensing (active FO-DTS) in two experimental systems to evaluate cover efficiency and test the effectiveness of active FO-DTS to infer moisture content: 1) An experimental waste rock pile, which is 60 m long, 32 m wide, and covered with 0.25 m of non-reactive crushed waste rock and 0.75 m of sand. Five hundred meters of fibre optic cable is laid in a grid pattern at three levels within the pile. 2) A laboratory waste rock column (0.80 m diameter) with 0.45 m of non-reactive crushed waste rock overlain by 0.20 m of fine sand. The fibre optic cable is wrapped to 3 helixes within the cylindrical column.

Volumetric moisture content is calculated during 900 second heat cycles at 10 and 15 W/m in the waste rock pile and column respectively. Results from the waste rock column suggest that the cover creates a capillary barrier that limits downward water infiltration and active FO-DTS could serve as a practical means to monitor moisture changes in soils and aggregates.