

APPLICATION OF THE PASSIVE SEISMIC HORIZONTAL OVER VERTICAL SPECTRAL RATIO (HVSr) TECHNIQUE FOR EMBANKMENT INTEGRITY MONITORING

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Embankments are common features in mine sites necessary for tailings storage, surface water management or general infrastructure such as dewatering ponds. Differing construction methodologies, from loosely placed waste material to engineered and individually compacted lifts, will achieve varying density, strength and permeability. Conventional construction quality assurance is however not always possible without causing significant interruptions to the construction program and compromising the embankment integrity. Estimating levees' bulk shear wave velocities via passive seismic HVSr surveying as a proxy for stiffness is a practical, continuous and non-invasive method that can be carried out with limited construction interruption. This also provides a continuous dataset throughout the embankment as opposed to discrete observations using conventional geotechnical methods.

Field data acquired over the length of several embankment types demonstrate the very good correlation between estimated bulk shear wave velocities and the levees' degree of compaction. As a result, alternative construction methodologies can be quantitatively benchmarked against a bulk density spectrum with fully engineered embankments and loose waste dumps as end-members. Collection of repeated measurements over time also discriminated stable embankments from settling ones, and constitutes a cost-effective way to identify possible zones of weakness before hazardous failure.