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NON-INVASIVE DETECTION OF SEDIMENTATION AND ITS REMOVAL IN INDUSTRIAL PIPELINES

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The paper describes the extensive field evaluations of the 'Settled Bed Detector' on different mine sites over a 12-month period. Applications range from cemented backfill, a well-graded magnetite product, coarse phosphate tailings and a fine cyclone overflow stream gravitating down a partially-filled pipe. Even though it was evident that stationary beds occurred repeatedly whenever process conditions became unfavourable, this did not pose an immediate risk towards blockages. In most cases, the beds were rapidly depleted as soon as either the flow rate was increased, or when the slurry relative density was changed. In other instances, stationary beds remained in the pipeline during extended shut-down periods, which posed a serious risk for cemented backfill operations. Where typical flow rate fluctuations regularly produce and soon thereafter remove small beds, it is undesirable to raise an alarm each time a bed develops. In order to only trigger meaningful alarms, additional sensors had to be placed strategically on the side of the pipeline to detect the actual bed height. This configuration proved to be so successful, that the next generation of the instrument is in the process of being developed with multiple sensors along the pipe circumference to accurately determine the horizontal interface level between the stationary bed and the flow above it. With a few instruments along the entire pipe route, this new configuration also enables the tracking of moving dune formations, or the deliberate operation of a pipeline with a controlled stationary bed to reduce abrasive wear at the pipe invert.
KEY WORDS: Non-invasive sensing, stationary beds, alarm triggers, bed height detection