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Integrity of high-velocity water slug generated by an impacting technique SEVDA DEHKHODA, University of Queensland/CRCMining Brisbane QLD 4067 Australia, NEIL BOURNE, AWE, Aldermaston, Reading, Berkshire, RG7 4PR, United Kingdom — A pulsed water jet is a series of discrete water slugs travelling at high velocity. Immediately after striking a target, these slugs apply high-intensity, short-duration transient stress known as the water hammer pressure, followed by low-intensity, long-duration stationary stress at the stagnation pressure. The magnitude and duration of the water hammer and stagnation pressures are controlled by the size and quality of the water slugs. The use of water jets for rock cutting in mining operations is a centuries-old technology; however, practical methods for producing high-energy water slugs repeatedly have proven difficult. This can be partly due to the fact that the geometrical properties of a jet and so its effectiveness in creating damage is controlled and influenced by the method that is employed to generate the water slugs. This paper investigates the integrity of a single water slug produced using an impacting technique where a hammer strikes a piston, resting on top of a water-filled chamber. The coherence of the generated water pulse was of concern in this study. If repeated shock reflections within the chamber were transmitted or were carried into the internal geometry of nozzle, the emerging jet could pulsate. The impact impulse of the formed water jet was measured in a Kel-F target material using an embedded PVDF (Polyvinylidene fluoride) shock gauge. The recorded stress waveform was then used to study the quality and endurance of the water pulse stream as it travelled through air.

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