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1 Influence of liquid CO₂ phase transition blasting on hydraulic fracturing in 2 combined fracturing conditions

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9 **Abstract:** Enhancing the permeability of coal seams is crucial for improving coalbed methane extraction. To

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18 and propagation of hydraulic fractures primarily occur during the cyclic energy storage and fracturing stage,

19 where a strong correlation between injection pressure and acoustic emission (AE) energy signals was observed.

20 The relationship between breakdown pressure and in-situ stress shows that a reduction in maximum principal

21 stress (σ_1) increases the sample's breakdown pressure, while intermediate (σ_2) and minimum (σ_3) principal

22 stresses exhibit the opposite effect. After liquid CO₂ phase transition blasting, the influence of blasting-induced

23 fractures on hydraulic fractures is reflected in three key aspects: shortening the duration of the cyclic energy