

Flow Visualization Utilizing Airborne Thermography¹

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Abstract: In this study, an airborne thermography system was successfully developed and used to characterize short-circuiting and estimate the mean surface velocity of water from an AMD seep. The system's first test was conducted at Squatter Falls passive treatment system in Western Blair County, PA where high contrast thermal imagery was collected from an unmanned aerial system (UAS) allowing for rapid visual assessment of short-circuiting occurring near the seep. This revealed temperature discrepancies on the Northern bank of the first treatment cell indicated that a small amount of water from the seep was not receiving treatment. The next test of the system was a thermal tracer experiment conducted at the discharge of the first treatment cell into the second, which demonstrated the viability of utilizing heated water as a low-impact tracer. To evaluate the use of this tracer in other applications, a velocimetry study was conducted at Brubaker run near Dean, PA. The thermal imagery from the study was run through an automated image analysis program, which estimated flow rates by tracking the plume's centroid with respect to a ground reference point. Quality Assurance of the program was done by comparing the velocity measurement from a weir just downstream, yielding a 6% difference between the two measurements.

Addition Key Words: UAS, thermography, remote sensing, passive treatment

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 3. Work reported here was conducted near 40.5164° N, 78.5164° W.