

VISUAL DEMONSTRATION OF WATER DISTRIBUTION PATTERNS IN VERTICAL FLOW SYSTEMS¹

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Abstract: Passive treatment of coal mine drainage implies long life with low maintenance using non-dangerous chemicals or treatment media. In 1997 and 1998 four such systems were installed in the Slippery Rock Creek watershed in northern Butler County, PA. These Vertical Flow-type systems utilize organic material known as spent mushroom compost which was either blended with fine limestone aggregate or placed above large size limestone aggregate. In 1998 a series of dye tests were performed on the Jennings VFS to investigate certain presumptions that had been made concerning uniform water distribution through the treatment media. From this study, it was concluded that to avoid short circuiting of the treatment media uniform water distribution is a significant design concern. This present study is an extension of that work to three other systems, SR109, SR 85/86, and SR 87/88, in addition to the Jennings VFS. For all the dye tests, 5/8" diameter non-toxic iridescent dye tablets were added to the flowing water stream at the influent channel stream of each VFS. Where possible, the distribution of the dye in the VFS pond was observed for a number of hours after dye addition was terminated. Separate tests were conducted on three of the four Vertical Flow Systems studied with both green and red dye to determine which was most visible. Still photographs were taken and video recording was conducted, the video camcorder generally providing better recognition of the dye coloring. Dye plumes varied in size and location ranging from 5' at SR85/86 to over 160' at SR87/88. The observations made during this study indicate that these systems may be plugging and further investigation is needed.

Additional Key Words: acid mine drainage, dye test, passive treatment, spent mushroom compost, and vertical flow pond

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