

37. Evaluating Engineering Controls during Asphalt Paving Using a Portable Tracer Gas Method

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Initiated by the National Asphalt Pavement Association (NAPA), five asphalt paver manufacturers, representing more than 80% of the highway-class paver market, independently designed engineering controls for their respective pavers. Through an agreement with the Department of Transportation (DOT), NIOSH assisted the manufacturers with their prototype designs, then independently evaluated each prototype's performance using qualitative smoke and quantitative smoke methods. Video recordings documented each prototype's ability to capture tracer gas under "managed" indoor conditions. Sulfur hexafluoride (SF₆) was the tracer gas used to quantify the capture efficiency and exhaust flow rate for each prototype.

The first phase of this research included stationary tracer gas testing of five different prototype engineering controls installed on asphalt pavers. The stationary tracer gas method called for the release of tracer gas from nine locations below the auger of the paving machine and resulted in capture efficiencies averaging from 7% to 100% indoors and from 0.5% to 81% outdoors. Based on the stationary evaluations, several manufacturers redesigned their controls to improve capture efficiency in preparation for performance evaluations at actual paving sites. During the second phase of the research, laboratory tracer gas methods were modified to be field portable. Tracer gas was released from four locations above the auger during actual asphalt paving operations and provided results within the hour. An industrial hygiene area sampling method was also used to quantify capture efficiency during actual paving operations; however, this method required many weeks of sample processing. During four days of paving, the capture efficiency of one redesigned engineering control was 94% based on 12 tracer gas measurements and 93% based on 4 industrial hygiene measurements. This paper describes the engineering control design, the field tracer gas method, the industrial hygiene method, and the capture efficiency results obtained during actual paving operations.

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