

CHARACTERIZATION OF PETROLEUM ASPHALT AEROSOL IN A LABORATORY GENERATION SYSTEM. Seth Tomblyn*, William G. Jones, W. Travis Goldsmith, Sam Stone, Ali Afshari and David Frazer. National Institute for Occupational Safety and Health, 1095 Willowdale Road, Morgantown, WV 26505.

Petroleum asphalt is the residue of the fractional distillation of crude oil. During the paving process, a mixture of aerosol and gas forms as air passes over the asphalt surface. The focus of this abstract is to characterize the aerosol generated from the heating of the asphalt. Its chemical composition has been previously discussed by Wang et al. (2000). A system was purchased (Heritage Research Group) and modified to generate asphalt aerosol and gas for use in small animal inhalation exposures. Hot performance grade asphalt (PG 64-22, Asphalt Materials, Inc.) was heated to 170 deg C. The heated asphalt flowed onto a tilted plate (1.3 degrees from horizontal, 6" by 24") at a rate of 150 g/min. A temperature gradient was maintained along the plate to mimic paving conditions seen in the field. Air was passed over the plate at a rate of 20 L/min. The mixture of air, aerosol and gases rising from the asphalt surface was passed through a heated 1/2" stainless steel pipe into the animal exposure chamber, where all air sampling was conducted. Gravimetric measurements averaged 25 mg/m³ over 12 runs. A light scattering device was used in the system to estimate real-time chamber concentration and on average these readings were approximately 1.6 times greater than the gravimetric reference. Particle size distribution measurements were made with an aerodynamic particle sizer (APS) and a differential mobility particle analyzer (SMPS). Results indicated a number concentration peak occurring at around 1 μ m. The mass concentration spectrum of the APS data showed bi-modality with peaks at approximately 2 and 20 μ m, respectively. In order to view these particles microscopically, the asphalt aerosol was accelerated toward a glass surface using an impactor of our own design. The surface was pre-coated to prevent spreading of the impacted particles. Observation of particles thus collected revealed a polydisperse mix of liquid spheres. Examination of filter deposits and sample collection assembly with ultraviolet light proved to be a useful tool for documenting sample integrity and filter loading characteristics. This work was supported, in part, by NIEHS/NTP.

Wang, J., Frazer, D. G., Tomblyn, S., Stone, S., Afshari, A., Zhong, B. Z., Lewis, D. M. and Siegel, P. D. (2000). Characterization of Asphalt Fume Generation System. 39th Annual Meeting of the Society of Toxicology.

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