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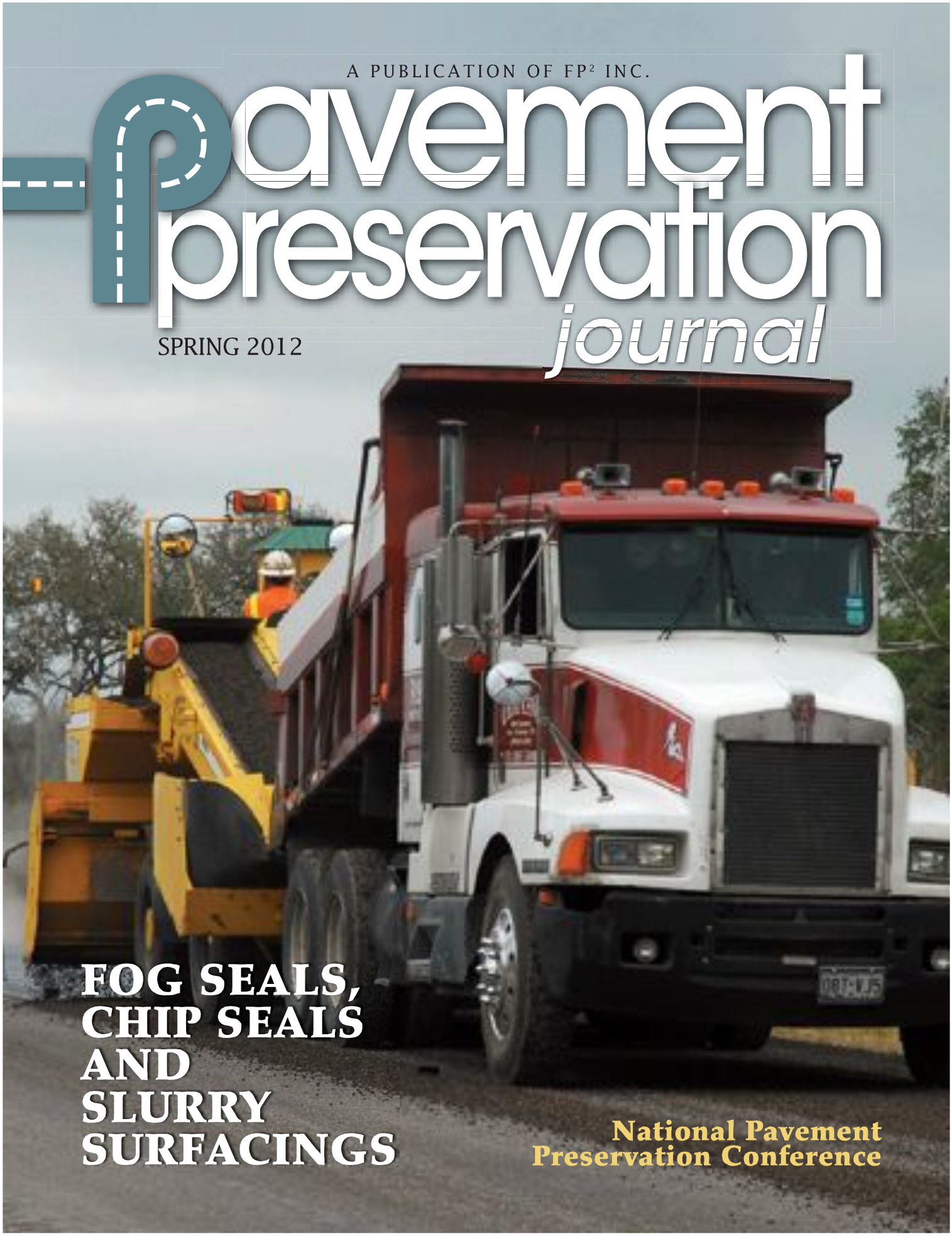

FOG SEALS, CHIP SEALS AND SLURRY SURFACINGS

National Pavement Preservation Conference

Why to Cut Back on Cutback Asphalt

by M. Bahadir Erten and Umid Azimov

Prime coat is used to penetrate and bond the loose material on the sub-base before subsequent hot mix asphalt or surface treatment is applied.

As Stephen et al. stated, "Low viscosity medium curing (MC) grades of liquid asphalt are generally used for prime coat when dense, hard to penetrate bases are to be primed, typically an MC-30 or MC-70" (Stephen & Shrestha, 2005, p. 28). MC-30 is a type of cutback asphalt which is prepared by blending high viscosity asphalt cement with petroleum solvent to lower the viscosity in order to achieve better penetration.

However, engineers are concerned with the use of cutback asphalt as prime coat for at least three reasons: **environmental issues, fire hazards** and potential **health risks** posed to construction workers.

ENVIRONMENTAL ISSUES

The main environmental concern with prime coat applications is air pollution associated with the release of volatile organic compounds (VOCs) into the air (Freeman, Button, & Estakhri, 2010, p. 17). VOC emission results from the evaporation of the petroleum solvent used to reduce viscosity of the asphalt cement. The restriction on VOCs is intended to reduce ground level ozone (smog) formation. VOCs are a group of photochemically reactive pollutants that combine with nitrogen oxides in the presence of sunlight to form ozone.

Stephen & Shrestha also noted that cutback asphalts are the major source of VOCs as only minor amounts of VOCs are emitted from emulsified asphalts and asphalt cements (Stephen & Shrestha, 2005, p. 61). According to the Resource Conservation and Recovery Act (RCRA), asphalt cement is not considered a hazardous material. However, RCRA defined diluents used to make cutback asphalts or additives added to emulsifying agents or performance enhancing agents in asphalt emulsions as hazardous materials (Stephen & Shrestha, 2005, p. 15).

The use of cutback asphalt is regulated in many jurisdictions to help reduce VOC emissions (Asphalt Institute, 2009). In the state of Texas, the Texas Natural Resource Conservation Commission has established strict guidelines to prohibit the use of cutback asphalt for most applications between April 16 and September 15 of any year. The regulation affects major metropolitan areas in Texas (O'Leary, p. 2; Texas Natural Resource Conservation Commission, 2002, p. 3).

FIRE HAZARD

MC-30 may pose a potential fire hazard during manufacture and construction. According to Material Safety Data Sheet (MSDS), the flash point of MC-30 cutback asphalt material varies from 120 to 140 deg F. It is flammable and needs special handling and storage consideration to prevent fire and explosion (Martin Asphalt Company, 2007; Valero Marketing & Supply Company and Affiliates, 2011).

According to Stephen & Shrestha (2005), fire can be a concern when using MC for prime coat or rapid cure cutbacks (RC) for tack coat as application often involves heating the material above its flash point (p.15) (Valero Marketing & Supply Company and Affiliates, 2011).

HEALTH RISK

MC-30 cutback asphalt may pose a health risk to the pavers. Inhalation of vapors, mist or asphalt fumes will cause headaches, nausea, dizziness and intoxication. Additionally, vapors or mist may irritate eyes. Prolonged dermal exposure to kerosene (petroleum solvent for MC-30 cutback asphalt) may produce dermatitis. Asphalt fumes contain substances that are known to cause cancer in humans.

Stephen & Shrestha (2005) note that worker's health safety issues stem from exposure to the cutback and stability or reactivity of the cutback. The majority of the materials typically used for prime or tack are reactive or pose more than a slight health risk (p.15).

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