Asphalt Emulsion Oil to TerraPrime Conversion

Streets and Storm Drainage Departments Make the Big Move

San Marcos Texas

Asphalt has been used since before Roman times as a glue and for water proofing. In a few places in the world, it's naturally occurring, such as in a lake on the island of Trinidad and in the LaBrea "tar pits" in downtown Los Angeles. Almost all of the asphalt used today for paving comes from petroleum crude oil.

Asphalt Emulsion Product (AEP) is a mixture of asphalt oil and water and is used as a dust suppressant and base treatment prior to asphalt application. As a hydrocarbon based product, it contains chemicals not necessarily friendly to the soil and stormwater runoff. Chemicals such as benzene, pyrene, naphthalene, and C6-C35 hydrocarbons are present in the high percentage levels and some are known and possible carcinogens. (See **Table 1** attached). This product has been the standard for decades and now in 2018 the Streets and Drainage departments are about to change that for San Marcos, Texas.

During an exercise to develop standard operation procedures to minimize exposure and reduce runoff of AEP, the managers of these two departments considered product substitution as an option. The SOP development process was part of the City's Municipal Small Separate Stormsewer System (MS4) permit requirements for Good Housekeeping and Pollution Prevention measures.

Jesse Shroyer, Streets Manager for the City, was introduced to an alternative product made in Austin Texas called TerraPrime. The product used by a local contractor, was preferred by Jesse and the contractor, because it was polymer-based and had a short 1-hour cure time. This allowed ashphalt to be applied within a 1 to 2 hour wait, rather than a 24-hour wait as with AEP. Projects can be completed faster and with less fumes, odors, stains and runoff than the AEP oil. Shawn Wolfshohl, Stormwater Systems Manager for the City of San Marcos, favored the product as well since it presented no runoff issues to the MS4 drainage system and creeks, and was far more ecologically friendly than AEP oil. Based on a favorable comparison/evaluation of the two products including cost, performance, worker safety and environmental protection, their supervisor, Sabas Avila approved the product substitution from AEP oil to TerraPrime.

TerraPrime was developed by Yetkin Yildirim, PhD, P.E. and his team in the Department of Civil Engineering at the University of Texas in Austin. The product was first developed and tested on a small scale basis and then field applied and proven through testing with the Texas Department of Transportation and the City of Austin. The product has superior strength and binding properties, dries within an hour thus allowing work to be completed days and weeks ahead of schedule, has no odor or tracking issues and is much safer to workers and the environment. Product testing, done by San Antonio Texting Labs shows that it has no detectable concentrations of volatile, semivolatile, heavy metals or petroleum hydrocarbons. **Table 1** shows the side-by-side comparison of the analysis of TerraPrime and AEP, and clearly shows the advantage of this product for human health and the environment. Costs are equivalent to AEP when comparing amount of product applied per unit area (gallons/ft2 or yd2).

The Streets Department estimates that between 4500 to 6000 gallons of AEP oil is used each year on the city's mill and overlay projects performed in-house. By changing to TerraPrime, the city will reduce the

(a) Prepared by Elizabeth (Lisa) Arceneaux, P.E. local environmental engineer.

application of 37,500 to 50,040 pounds of oil each year to the environment. This total includes a reduction of 5,200 to 6,900 pounds of chemicals that are covered under the TCEQ's Texas Risk Reduction Program for spills to the environment. Furthermore, the Streets Manager is also considering requiring all of the city's asphalt contractors to use TerraPrime instead of AEP for city roads. This proactive step will have a significant multiplying benefit for the environment in San Marcos.

Photos and Environmental Data

Photo 1: Typical mill and overlay project in San Marcos (2016). Prepared street before AEP oil is applied.

(a) Prepared by Elizabeth (Lisa) Arceneaux, P.E. local environmental engineer.

Photo 2: The prepared street after AEP was applied for dust control. Ponding and tracking is an environmental runoff concern.

(a) Prepared by Elizabeth (Lisa) Arceneaux, P.E. local environmental engineer.

Table 1
Comparison of AEP to TerraPrime
Constituents of Concern 2018 Laboratory Data

	Concentration (mg/kg)	
Chemical	AEP	Terra Prime
Nickel	1.58	<1.00
Benzene	7.3	<0.025
Toluene	89	<0.025
Ethylbenzene	71.3	<0.025
Xylenes	370	<0.075
Fluorene	6.1	<19.8
Napthalene	38	<19.8
Phenanthrene	15.4	<19.8
Pyrene	7.3	<19.8
Total Petroleum Hydrocarbons		
C6-C12	13400	<50
C12-C28	123000	<50
C28-C35	<500	<50
C6-C35	137000	<150

Notes:

(a) only those constituents detected in one or both samples are shown on the table
AEP sample 3/19/18 and Terra Prime sample 5/8/18

(b) Samples were analyzed by San Antonio Testing Labs, a NELAP certified lab, following EPA approved test methods. Full analytical reports are available for both samples.

(a) Prepared by Elizabeth (Lisa) Arceneaux, P.E. local environmental engineer.

From: **Elizabeth Arceneaux** <elizabeth.arceneaux@austin.rr.com>
Date: Tue, Aug 14, 2018 at 7:46 AM
Subject: paper
To: Yetkin Yildirim <yyildirim@terrapaveinternational.com>

Hi Yetkin, Please let Camp Mabry env. Staff know that we want to submit this product for the TCEQ Env. Excellence Award for the City of San Marcos so for them not to.

Lisa Arceneaux, P.E., CISEC, CPESC

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