

**Brambleton Community Association
Asphalt Sub-Committee**

**Report to the Grounds & Facilities Committee
January 7, 2019**

Introduction

This document is a summary of the findings of the Asphalt Sub-Committee (Sub-Committee). The Sub-Committee was established in February 2018 by the Grounds & Facilities Committee as directed by the Brambleton Community Association (BCA) Board of Directors on October 3, 2017. The purpose of the Sub-Committee is to advise the Grounds & Facilities Committee on the following matters:

- Review whether any immediate or long-term impacts have been linked to the use of the refined coal tar PaveRx rejuvenator product;
- Consider and recommend environmental studies that can be performed to determine impact to environments surrounding the applied PaveRx product;
- Review and recommend products that have similar performance and warranties as the PaveRx product as well as the financial impacts to the Association these products would have.

The Sub-Committee worked to address these matters in a reasonable and informed manner based on research performed in conjunction with BCA staff. It is the opinion of the Sub-Committee that the recommendations contained herein represent a balanced approach to asphalt maintenance. Specifically, the recommendations consider the health and safety of Brambleton's residents and environment while also seeking to minimize the life-cycle costs of the asphalt owned by the BCA.

Findings

The matters listed above are addressed in order as follows.

Review whether any immediate or long-term impacts have been linked to the use of the refined coal tar PaveRx rejuvenator product

The Sub-Committee is not aware of any adverse health or environmental impacts linked specifically to the use of the PaveRx rejuvenator product. However, taking a broader view, there does exist published research that links both coal tar and coal tar-based asphalt maintenance products to adverse health and environmental impacts. Importantly, coal tar and coal tar pitch are both classified as known human carcinogens by the U.S. Department of Health and Human Services¹. These substances contain high levels of polycyclic aromatic hydrocarbons (PAHs). For use in asphalt maintenance products, coal tar and/or coal tar pitch are generally processed, refined, or distilled in some manner prior to blending with additional substances. These additional substances are either solvents or non-soluble additives. Solvents are generally added to lower the viscosity of the coal tar component to produce asphalt "rejuvenator" products that soak into the asphalt and restore ductility and appearance. Non-soluble additives are generally used to produce emulsions for asphalt "sealcoat" products that form a layer on the surface of the asphalt and restore appearance.

The published research referenced herein^{2,3} is a small sampling of publications that link coal tar-based products to adverse health and environmental impacts. This research focuses on the high levels of PAHs that exist in coal tar-based products. The U.S. Environmental Protection Agency identifies seven PAHs as probably human carcinogens and 16 PAHs as Priority Pollutants. The high levels of PAHs in coal tar-based products exist despite any processing, refining or distilling of the coal tar component that may have been performed by the manufacturer. For example, PaveRx contains naphthalene, anthracene, benzopyrene, trimethylbenzene, phenanthrene and other unidentified PAHs according to its Safety Data Sheet, despite it containing “refined” coal tar. The above referenced research compares the relatively high concentrations (50,000 to 100,000 mg/kg) of PAHs found in coal tar-based sealcoats to the relatively low concentrations (50 mg/kg) of PAHs found in asphalt-based sealcoats. Exposure to PAHs occurs when coal tar-based sealcoats age and wear into small particles that can be tracked into homes, inhaled, ingested, blown by the wind, or washed into streams and ponds via rainfall runoff.

The Sub-Committee recognizes that this research generally refers to “sealcoat” products rather than “rejuvenator” products, however, two points deserve consideration in this regard. First, PaveRx contains a similar or greater percentage of refined coal tar (30-50%) than the sealcoat products described in the above research. Second, an experienced distributor of coal tar-based rejuvenator products stated to the Sub-Committee that in practice, a majority of the coal tar component of rejuvenators remains on the surface of the asphalt. For these reasons, the Sub-Committee believes that the research implicating coal tar-based sealcoats with adverse health and environmental impacts is relevant to both sealcoats and rejuvenators and that this research should influence the Sub-Committee’s recommendation of a safe product for Brambleton’s roads, alleys, and parking lots.

Consider and recommend environmental studies that can be performed to determine impact to environments surrounding the applied PaveRx product

The Sub-Committee recommends that no environmental studies be performed at this time. Any such study would likely be constrained to a small sample size because of budgetary restrictions and the results would not be conclusive. There exists enough published literature on the adverse environmental impacts of coal tar to make an informed decision to avoid introducing this substance into the Brambleton community. Numerous jurisdictions across the United States, including the states of Minnesota and Washington, have made this decision and have banned coal tar-based asphalt products.

Review and recommend products that have similar performance and warranties as the PaveRx product as well as the financial impacts to the Association these products would have

The Sub-Committee reviewed three types of asphalt maintenance products: rejuvenators, sealcoats, and slurry seals. The following is a brief description of each.

Rejuvenators are designed to penetrate some distance into asphalt. These products replace oils lost to oxidation and restore flexibility and ductility to asphalt. This reduces cracking and

raveling of the asphalt surface. Rejuvenators improve the appearance of asphalt by restoring a deeper color to the surface of gray, aged asphalt. Rejuvenators may be coal tar-based, asphalt-based, or bio-based.

Sealcoats remain on the surface of the asphalt and create a noticeable coating. They are intended to create a barrier to prevent oxidation and the loss of oils from the asphalt. Sealcoats improve the appearance of asphalt; however, this improvement diminishes over time as the sealcoat coating wears away. Sealcoats are generally either coal tar-based or asphalt-based, although latex and polymer formulations are also available.

Slurry seals are asphalt-based products that form a relatively thick wear surface on existing asphalt. Slurry seals contain sand to improve their durability and skid-resistance. The thickness of the slurry seal and the size of the sand grains can be varied depending on the application. Generally, thinner slurry seal coatings and smaller sand grains yield smoother surfaces.

After reviewing the various types of asphalt maintenance products, the Sub-Committee and BCA staff agree that rejuvenators are preferred to sealcoats or slurry seals for the following reasons:

1. BCA has used asphalt rejuvenators and has seen that rejuvenators work. The rejuvenator product is designed to be absorbed into the asphalt and rejuvenate the asphalt; it does not just coat the surface. Slurry seal and sealcoat products do not change the integrity of the asphalt, they are just applied on top.
2. Rejuvenators have the potential of reducing future maintenance costs more than the alternatives, as they prevent the aging of the asphalt itself rather than covering up aging asphalt. The cost of rejuvenators is within the Reserve Study budget and best practices for asphalt maintenance BCA has operated on for the past 10+ years.
3. BCA staff is familiar with the process of the application of the asphalt rejuvenator product; BCA staff knows how to prepare and manage the application of a rejuvenator.
4. Slurry Seal Pavers suggested the combination of three different products for BCA streets, however, this would be complicated for BCA staff to manage and plan.
5. Resident feedback from the slurry seal application VDOT applied to VDOT roads in Brambleton (summer 2018) was not positive and concerns for the “look” of the roads was brought to BCA staff attention by several residents.
6. Slurry seal and sealcoat products tend to chip and flake, unlike asphalt rejuvenators.

For reasons described previously in this document, the Sub-Committee further recommends that asphalt-based or bio-based rejuvenator products with low or zero concentrations of PAHs be used in lieu of coal tar-based rejuvenator products. Initial pricing for these products is similar or only slightly higher than for PaveRx. BCA recently paid about \$1.35 per square yard for PaveRx. An asphalt-based rejuvenator named AR-16 is estimated to cost this same amount. A bio-based rejuvenator named Veritas Green is estimated to cost slightly more, about \$1.50 per square yard.

Prior to selecting a rejuvenator product for the next round of BCA asphalt maintenance, PAH levels of the products should be reviewed, even if coal tar is not present. For example, a review of the Safety Data Sheet for AR-16, an asphalt-based rejuvenator, indicates that this product may still contain significant levels of PAHs. Additionally, recent research⁴ conducted at Worcester Polytechnic Institute indicates that certain bio-based rejuvenators may contain PAHs. The Sub-Committee should continue to review proposed rejuvenator products and provide recommendations to BCA staff.

Conclusion

The Sub-Committee recommends that non-coal tar-based asphalt rejuvenator products with ***low or zero concentrations of PAHs*** be used on BCA roads, alleys, and parking lots. These products will generally be asphalt-based or bio-based. Coal tar-based rejuvenators should not be used. The Sub-Committee recommends that it remain partially active for the next two years, during which time it will periodically meet with BCA staff to discuss new and revised rejuvenator product options and evaluate the performance of asphalt treated with non-coal tar-based products. During this time, the Sub-Committee can also review any other asphalt maintenance products or combinations of products that may become commercially available. Although there is some level of toxicity with all products, the Sub-Committee's recommendation is based on the best combination of health, safety, cost, and performance.

References

1. National Toxicology Program, 2014, Report on carcinogens (13th Ed.): Research Triangle Park, N.C., U.S. Department of Health and Human Services, Public Health Service.
2. Mahler, B.J., Woodside, M.D., and Van Metre, P.C., 2016, Coal-Tar-Based Pavement Sealcoat – Potential Concerns for Human Health and Aquatic Life: Fact Sheet 2016-3017, U.S. Geological Survey.
3. Williams, E.S., Mahler, B.J., and Van Metre, P.C., 2013, Cancer risk from incidental ingestion exposures to PAHs associated with coal-tar-sealed pavement: Environmental Science and Technology, v. 47, p. 1101-1109.
4. Barr, J., Cammarata, D., Rivera, R., Walck, C., and Water, J., 2018, Environmental Impacts of Pavement Rejuvenators: Unpublished major qualifying project, Worcester Polytechnic Institute, Worcester, MA.