Is Asphalt the Answer to our Plastics Problem?

IS ASPHALT THE ANSWER TO OUR PLASTICS PROBLEM?

BRETT WILLIAMS

• Trade Association representing asphalt industry

What Is NAPA?

• NAPA’s Mission
  • Support
  • Advocate
  • Advance

What Is NAPA?

• Three E’s
  • Engineering
  • Economics
  • Environment

FHWA Recycling Policy

• FHWA, 2015

Current Status

• Social media explosion
  • Washington Post
  • The Economist
  • Addressing America’s Surface Transportation Infrastructure Needs
  • American Chemistry Council
  • Plastics Industry Association

When Asphalt Went Viral

• Reclaimed asphalt pavement
  • Recycled asphalt shingles
  • Recycled tire rubber
  • Plastics?

Recycling Responsibly

• Social media explosion
  • Washington Post
  • The Economist
  • Addressing America’s Surface Transportation Infrastructure Needs
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When Asphalt Went Viral
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**It’s Just Plastic, Right...?**

<table>
<thead>
<tr>
<th>Number</th>
<th>Type</th>
<th>Application</th>
<th>Melting Point (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Polyethylene Terephalate (PET)</td>
<td>Water Bottles</td>
<td>&gt;482</td>
</tr>
<tr>
<td>2</td>
<td>High Density Polyethylene (HDPE)</td>
<td>Plastic bags</td>
<td>266 but can vary</td>
</tr>
<tr>
<td>3</td>
<td>Polyvinyl Chloride (PVC)</td>
<td>Pipes</td>
<td>212-500</td>
</tr>
<tr>
<td>4</td>
<td>Low Density Polyethylene (LDPE)</td>
<td>Trays</td>
<td>230-248</td>
</tr>
<tr>
<td>5</td>
<td>Polypropylene (PP)</td>
<td>Hinges</td>
<td>320-330</td>
</tr>
<tr>
<td>6</td>
<td>Polystyrene (PS)</td>
<td>CD Casing</td>
<td>GS at 212</td>
</tr>
<tr>
<td>7</td>
<td>Others</td>
<td>Baby bottles</td>
<td></td>
</tr>
</tbody>
</table>

**Plastic Breakdown in MSW**

(Dubois, 2020; based on EPA, 2017)

**When In Doubt ... Do A Lit Review**

- **Plastics Recycling**
  - Collection
  - Shredding
  - Washing
  - Decontamination
  - Significant investment needed

**Plastic Recycling**

- **Wet Process**
  - Modification or replacement?
  - 2 – 8% by weight of binder
  - Low melting point needed
- **Dry Process**
  - Aggregate replacement
  - Mixture modifier
  - Aggregate modifier
  - 0.2 – 1% by agg weight

**Wet v Dry**

- **Binder Performance**
  - Plastic stiffens asphalt binder
  - Little data on fatigue
  - Little data on low-temperature
  - Phase separation tendencies
  - Additives may help
  - PE insoluble in many solvents

**Laboratory Binder Testing**
• Marshall stability
  • Increased Marshall stability
  • Increased stiffness
  • Increased rutting resistance
  • Wet – Stiffer binder
  • Dry – Increased aggregate friction
  • Moisture damage
  • Positive or no impact

Laboratory Mixture Characterization

• Most documentation on plant operations relates to Novophalt
  • High-shear blending unit

Plant Operations

• One study documented construction
  • Difficult to compact
  • Heavy rollers required
  • French construction
  • Temperature sensitive, but compaction not an issue

Construction

• Two potential concerns in literature
  • Leaching of toxic components
  • No adverse effects (one study)
  • Chlorine-based gases from PVC

Health & Safety

• Environmental Benefits
  • Preservation of resources
  • Reduction of solid waste
  • Emission reduction
  • Environmental Concerns
  • Future recyclability
  • Ongoing work

Environmental

• 200 Field Projects in Literature
  • Improved rutting
  • More cracking
  • New field projects
  • India
  • Australia
  • Canada
  • New Zealand
  • And More...

Field Projects

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Knowledge Gaps

- Sourcing of plastics
- Methods of incorporation
- Modifier or replacement
- Binder characterization
- Mixture characterization
- Plant operations
- Construction
- H&S
- Environmental
- Field performance

Moving Forward

- Patience
- Partnership
- Communication

What’s Happening

- NCHRP 9-66
- FHWA Project
- Field Projects
  - California
  - Texas
  - Michigan
  - Wisconsin
  - Pennsylvania
  - More...

Thank you, Alabama!

Gold Club (50+ Years)
- Vulcan Materials Co.

30-Plus Club
- John M. Warren Inc.

Alabama Members
- Command Alkon Inc.
- Construction Partners Inc.
- Dunn Construction Co. Inc.
- East Alabama Paving Co. Inc.
- H. O. Weaver & Sons Inc.
- HCL Contracting LLC
- S. T. Dunn Construction Co.

THANK YOU!

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