Awake and Alert?
Overview

- Introduction
- Background to unpaved road chemical treatment specifications
- Provisional specifications
- Summary
Introduction

- Chemical treatments formally used on unpaved roads since 1907
- Currently >190 named products available in the USA, mostly proprietary
- Difficult for many agencies to source proprietary products
  - Generic information required
- Limited specification development
  - Procurement
    - Environmental
  - Application
- Only calcium chloride and asphalt emulsions have formal ASTM/AASHTO product specifications
- Limited road authority specifications
  - FHWA
  - Counties
  - Lignin Institute (tests not formalized)
- 2013 FHWA Guide
Background

- Literature review and discussions
- ASTM Specs
- FHWA Standard Specs
- County specs
- Qualified product lists
- EPA Environmental Technology Verification Program
- Clear need for generic specifications to cover all product categories
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Procurement

- Based on any agency being able to specify a category of product(s) based on selection results

Certificate of compliance
- Name and category
- Verifications
  - Category requirements
  - Safety data sheet
  - Environmental requirements

Category specifications
- ASTM format based on current calcium chloride spec
- ASTM tests

Example language provided in guide
# Example Spec Language

## Example Provisional Specification: Calcium Chloride Solution

Clear odorless liquid intended for fines preservation, dust control and/or stabilization of unpaved roads. It has the following properties in its undiluted state.

<table>
<thead>
<tr>
<th>Test Parameter</th>
<th>Suggested Acceptance Limits</th>
<th>Suggested Test Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium chloride content</td>
<td>28 – 42%</td>
<td>ASTM E449</td>
</tr>
<tr>
<td>Total magnesium as MgCl₂</td>
<td>&lt; 6.0%</td>
<td>ASTM E449</td>
</tr>
<tr>
<td>Total alkali chlorides as NaCl</td>
<td>&lt; 6.0%</td>
<td>ASTM E449</td>
</tr>
<tr>
<td>Calcium hydroxide content</td>
<td>&lt; 0.2%</td>
<td>ASTM E49</td>
</tr>
<tr>
<td>pH (5% solution)</td>
<td>7.0 – 9.0</td>
<td>ASTM D1293</td>
</tr>
<tr>
<td>Specific gravity</td>
<td>1.28 – 1.44</td>
<td>ASTM D1429</td>
</tr>
</tbody>
</table>

**Notes**

1. ASTM D98/AASHTO M144

## Example Provisional Specification: Lignosulfonate: Calcium

Dark brown lignin-based liquid or powder with woody odor derived from the wood pulping using the sulfite process used in the manufacture of cellulose products and designed for fines preservation, dust control and/or stabilization of unpaved roads. It has the following properties in its undiluted/undissolved state.

<table>
<thead>
<tr>
<th>Test Parameter</th>
<th>Suggested Acceptance Limits</th>
<th>Suggested Test Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lignin sulfonate content (ready to use)</td>
<td>&gt; 25%</td>
<td>ASTM D4900</td>
</tr>
<tr>
<td>Residue (total solids content)</td>
<td>≥ 52%</td>
<td>ASTM D4903/D2834</td>
</tr>
<tr>
<td>Lignin sulfonated content of residue</td>
<td>&gt; 50%</td>
<td>ASTM D5896/D6406</td>
</tr>
<tr>
<td>Reducing sugars content of residue</td>
<td>&gt; 25% of dry weight</td>
<td>ASTM D1293</td>
</tr>
<tr>
<td>pH</td>
<td>6.0 – 9.0</td>
<td>ASTM D1429</td>
</tr>
<tr>
<td>Specific gravity</td>
<td>≥ 1.20</td>
<td>ASTM D2196</td>
</tr>
<tr>
<td>Absolute viscosity (Brookfield)</td>
<td>&lt; 1,000 cP @ 77°F (25°C)</td>
<td></td>
</tr>
</tbody>
</table>
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Environmental

- EPA recommended procedure
  - Chemical analysis
  - Volatile organic compounds
  - Semi-volatile organic compounds
  - Toxicity characteristic leaching procedure
  - Modified synthetic precipitation leaching procedure
  - Aquatic toxicity
Environmental

- EPA recommended procedure
- Certificate of compliance from EPA approved lab
- Updated as USGS recommendations become available
- Example language provided in guide
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Application

- Example language for:
  - Chemical treatment application plan
  - Contractor compliance
  - Equipment
  - Weather conditions
  - Application
    - Surface preparation
    - Spray-on
    - Mix-in
    - Curing
    - Records
  - Warranty
Overview

- Introduction
- Background to additive selection
- New selection guide
- Summary
Summary

- Chemical treatments since 1907
- Currently >190 named products available in the USA, mostly proprietary
- Difficult for many agencies to source proprietary products
- Limited specification development
- Limited road authority specifications
- 2013 FHWA Guide provides provisional specifications to address these needs
  - Updated as feedback from implementation is received
Thank-you

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