We are glad to be here today

Innovative Hydraulic Matrices: Expanded BMP’s Using Standard Equipment

Solutions for the Greener Good
Hydroseeding Equipment

- Range from 200 gallons to 3,000 gallons
- Several Manufacturers with a variety of different setups
- Highly versatile for Site-Management from Daily Cover to dust control and revegetating
- Many additional uses onsite including fighting fires

LSC ECA – 700 model
LSC PSA – 3,000 model
Extensive experience

- 27+ Years experience
- 100’s of customers, clients, and contractors
- In over 40 states domestically. Large international coverage.
Product Family

- Liquid
- Fiber Matrix
- EarthGuard® Edge (dry-applied)
- Biotic Soil Amendment
Hydroseeding technologies

- Being Specified for Dust control, temporary and permanent stabilization
- www.ectc.org for specifications and performance categories
  - Type 5 category is indicative of high performance needed

CCR Fines contained by LSC’s EarthGuard® Liquid
Proven: AASHTO/NTPEP
ASTM 6459 EarthGuard Testing

3:1 Slope Testing: 2”, 4” & 6” Event – 20 min Intervals

99.9% Effective
Hydroseeding has a large domestic presence

- 1,000’s of acres sold annually to all major markets channels
  - DOT’s
  - Private
  - Oil and Gas sector
  - Mining Operations
  - Emergency Response

- Recognized as top performer in all progressive erosion control states: CA, MN, SC, TX

- Product has been approved for use for over 20 years
Project Applications: Pipelines

July 17 - Application

August 9 – Permit Closure
Project Applications: Pipelines

Blanket vs. EarthGuard® Fiber Matrix
Project Applications: Commercial Hydroseeding

- 2:1 slopes using EarthGuard® Fiber Matrix
Project Applications:
Industrial Hydroseeding

Final Landfill Cap
HMM (Hydraulically-applied Mineral Matrix) i.e. Posi-Shell® EC

- Specifications by LSC Environmental
  - www.lscenv.com

- Patented unique solution

- Currently nothing like it on the market
What is Hydraulic Mineral Matrix

Posi-Shell + Durability Enhancer Slurry

- High swell bentonite-based, enhanced mineral material combined in field with Pozzolonic durability enhancer
- Small particulate material creates smooth viscous slurry
- Mixing consistency similar to Tapioca Pudding
- Used in the Solid Waste market since 27 year inception
- Mineral-based Erosion Control
- Ability to design in required attributes
- Commercial and industrial applications
  - Swale / Ditch Lining
  - Slope Stabilization
  - Pile Cover
  - Contaminated Soil Cover
  - SWPPP Flexibility
  - Landfill Applications
  - Alternate Intermediate Cover ***
  - CCR applications ***
- Lasts years with minimal maintenance
- No residual mess
- Excellent for Temporary Stabilization
- Proven Emergency Response applications
- 2000 TPD Landfill in Hong Kong
- Extreme Rainfall Intensity (4”/hour)
- 1 of LSC’s largest customers since 2009
Application: 17 acre Temporary Impermeable surface – Florida Intermediate cover
Applications - Coal Ash facility.

- Multiple facilities
- Daily to long term cover
- First site in 2015 monitored through Hurricane (23.5” in a week event)

Proven on 90+ inches of rain in North Carolina!!
Applications - Coal Ash facility.
Applications

Application on a raw resource pile in New York State.
Posi-Shell® EC Formulation

Used in several high profile environmental disasters

- 9-11 World Trade Center Debris Cleanup
- Wildfires
- Landfill Fires
- Hazardous Waste
- Landfill Landslides
HBSA (Hydraulic Biotic Soil Amendment)

- Category by ECTC (Erosion Control Technology Council)
  - www.ectc.org
  - Specifications for use and consideration

- Numerous products on the market representing most major manufacturers
What is It?
- Hydraulic Biotic Soil Amendment (HBSA)
- Organically derived materials
- Growth Stimulators
- Micro Organisms
- Erosion Control
- Organic Fertilizer

Effective For:
- Establishing growth when topsoil is depleted
- *EarthGuard Organix* for flat areas
- *EarthGuard Fusion* for slopes
## Available HBSA’s on Market

### Comparison of topsoil developing features of commonly used hydraulic biotic soil amendments

<table>
<thead>
<tr>
<th>Feature</th>
<th>Oganix™</th>
<th>Progences™</th>
<th>Biotic Earth™</th>
<th>Topsoil</th>
<th>PermaMatrix™</th>
<th>Compost</th>
<th>Fusion™</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Beneficial Microbes</strong> – Essential for a soil to remain alive and vital. Improves nitrogen fixation, soil structure, and maintenance of nutrients.</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<td>●</td>
</tr>
<tr>
<td><strong>Microbial and Plant Growth Stimulators</strong> – Improves plant cell division, photosynthesis, and nutrient use which creates healthy and robust plants.</td>
<td>●</td>
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<td>●</td>
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</tr>
<tr>
<td><strong>Peat</strong> – Increases water retention of soil and releases humic and fulvic acid. Well known stable growth medium.</td>
<td>●</td>
<td>●</td>
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<td>●</td>
</tr>
<tr>
<td><strong>Mycorrhizae</strong> – Creates healthier and more robust plants through improved root development.</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<td>●</td>
</tr>
<tr>
<td><strong>Thermally Processed Wheat Straw</strong> – Efficient soil cover regulating heat and moisture at the surface. Provides carbon, organic material and a microbial energy source that easily degrades. Does not lock up nutrients (like wood fibers.)</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<td>●</td>
</tr>
<tr>
<td><strong>Long-term Interlocking Fiber</strong> – Holds all other fibers together and provides microbial energy source for up to 2 years.</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td><strong>Organic Hydrocolloidal Tackifier</strong> – Provides initial energy source for microbes while sticking all materials together and to the soil.</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td><strong>Chemistry For Soil Structure</strong> – Rapidly develops and preserves existing soil structure and pore space which allows for proper infiltration while reducing soil crusting and soil loss.</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td><strong>Erosion Control</strong> – NO additional erosion control treatment needed.</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>
Pull Soil Samples.. PLEASE!

- Pull Composite Samples from top 6 inches.
- Make, buy, or steal soil probes
- Agricultural Sector will pull 1 every 200 linear feet!
  - Start with 1 every 1000 feet or maybe even 1 per project....
  - Target color changes and slope changes
- Need more specifications requiring soil testing
- Spend $20/sample on the tests you need.
$20 sample!

Ridiculous results

<table>
<thead>
<tr>
<th>Analysis</th>
<th>Units</th>
<th>Level Found</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic Matter</td>
<td>%</td>
<td>0.4</td>
<td>Very Low</td>
</tr>
<tr>
<td>Nitrogen</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface Nitrate</td>
<td>lbs</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Sub Nitrate</td>
<td>lbs</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Total Nitrate</td>
<td>lbs</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Surface Nitrate</td>
<td>ppm</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Sub Nitrate</td>
<td>ppm</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Phosphorus</td>
<td>ppm</td>
<td>10</td>
<td>Low</td>
</tr>
<tr>
<td>Bray Pi</td>
<td>ppm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Olsen</td>
<td>ppm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potassium</td>
<td>ppm</td>
<td>0</td>
<td>Low</td>
</tr>
<tr>
<td>Ammonium Acetate</td>
<td>ppm</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Calcium</td>
<td>ppm</td>
<td>68</td>
<td>Very Low</td>
</tr>
<tr>
<td>Ammonium Acetate</td>
<td>ppm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Magnesium</td>
<td>ppm</td>
<td>37</td>
<td>Low</td>
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<tr>
<td>Zinc</td>
<td>ppm</td>
<td>0.2</td>
<td>Very Low</td>
</tr>
<tr>
<td>Manganese</td>
<td>ppm</td>
<td>0</td>
<td>Very Low</td>
</tr>
<tr>
<td>Iron</td>
<td>ppm</td>
<td>0</td>
<td>Very Low</td>
</tr>
<tr>
<td>Aluminum</td>
<td>ppm</td>
<td>0</td>
<td>Very Low</td>
</tr>
<tr>
<td>Copper</td>
<td>ppm</td>
<td>0.1</td>
<td>Very Low</td>
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<tr>
<td>Boron</td>
<td>ppm</td>
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<td>Very Low</td>
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<tr>
<td>Sulfur</td>
<td>ppm</td>
<td>32</td>
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</tr>
<tr>
<td>Sodium</td>
<td>ppm</td>
<td>31</td>
<td>Medium</td>
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<tr>
<td>Chloride</td>
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<tr>
<td>Soluble Salts</td>
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<tr>
<td>Subsoil Soluble Salts</td>
<td>ppm</td>
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<tr>
<td>Excess Lime Rate</td>
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<td>3.9</td>
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<tr>
<td>pH</td>
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<td></td>
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<tr>
<td>Subsoil pH</td>
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<td>7.2</td>
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<tr>
<td>Buffer pH</td>
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<tr>
<td>CEC</td>
<td>meq/100g</td>
<td>0.8</td>
<td></td>
</tr>
</tbody>
</table>
Case Study: HWY 210 Project Photos
Case Study: HWY 210 Project Photos

LSC TRM Panel 10 days after product was sprayed
Case Study: HWY 210 Project Photos

1st year growth (die back)
Expected to take up to 3 years based on seed variety

Product in suspension
Case Study: Energy Company Well Pad

Lined and Graveled area
Thank You.

Solutions for the Greener Good

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Connect with us: