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Traditional Techniques and Methods used in Rubberized Asphalt

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EPA Scrap Tire Work Group Webinar
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Presentation Overview

- Asphalt Rubber Introduction
- Field Production of AR Binders
- Issues with Field Blending Processes
- Performance of AR Mixes
- Conclusions



Asphalt Rubber History

- Developed in 1960's by City of Phoenix Engineer
- Also referred to as the “wet process”, “field blend” or “McDonald Process”
- Large amount of crumb rubber used as a Binder Modifier
- Needs constant agitation



Asphalt Rubber

- Terms are Important
- 80 % Asphalt / 20 % Ground Tire Rubber
- ASTM D8 definition
- ASTM D6114 Specification



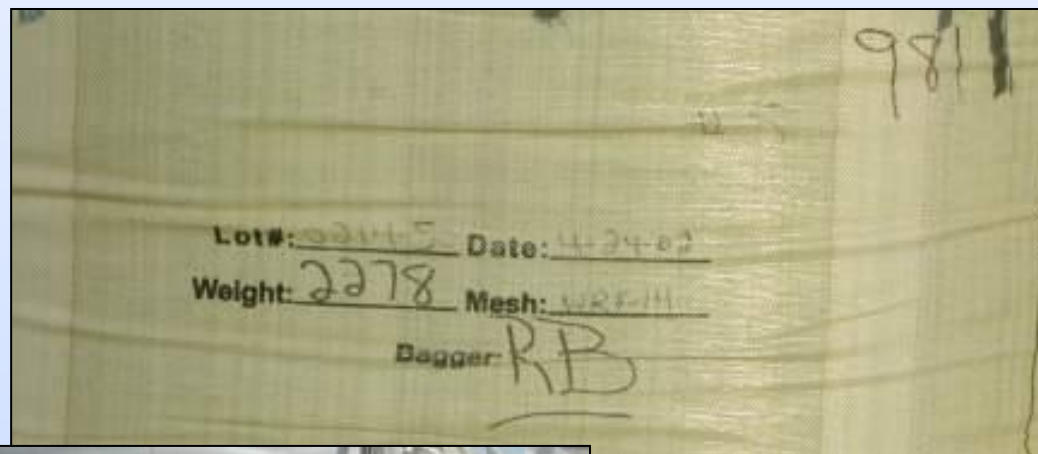






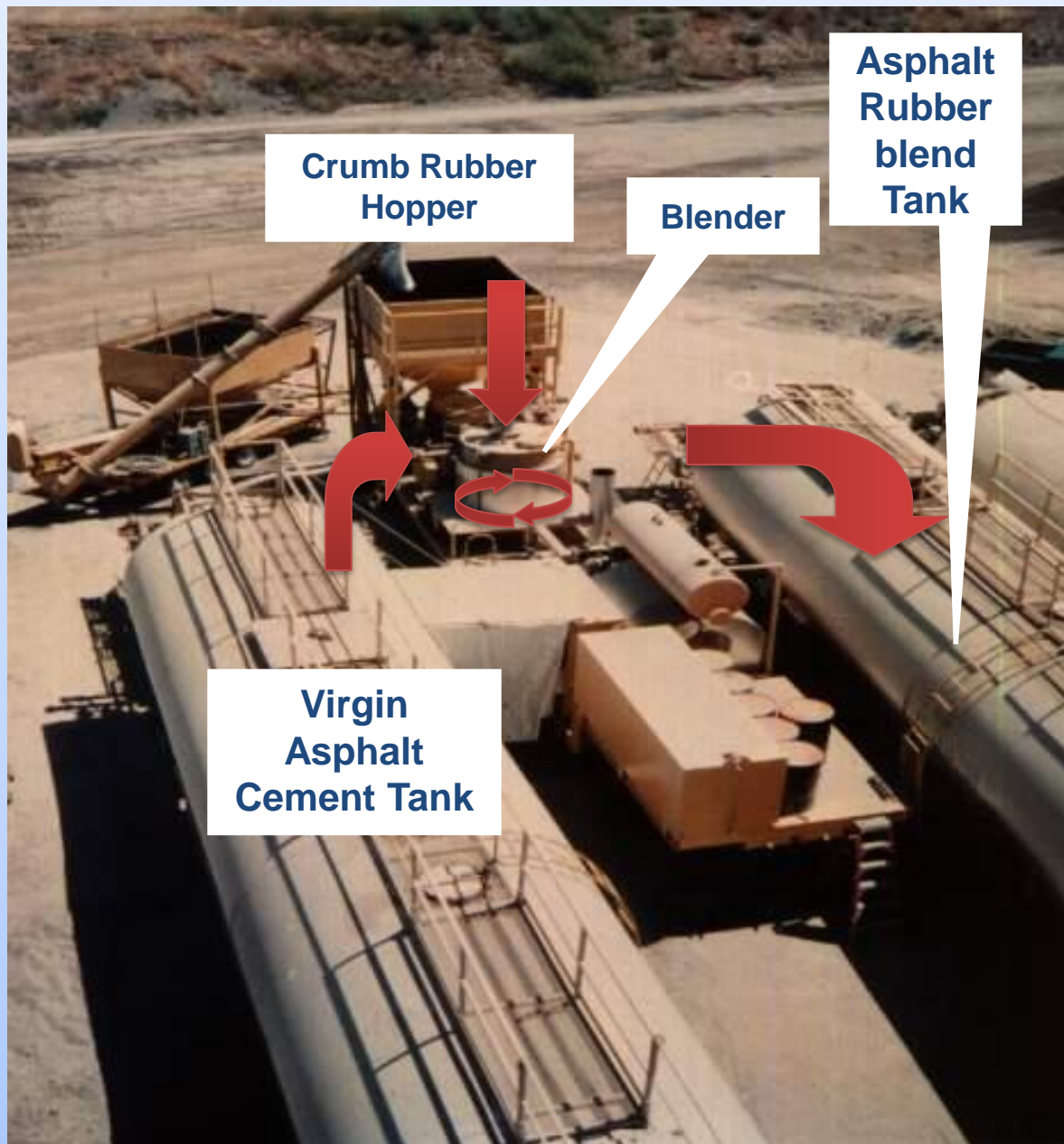
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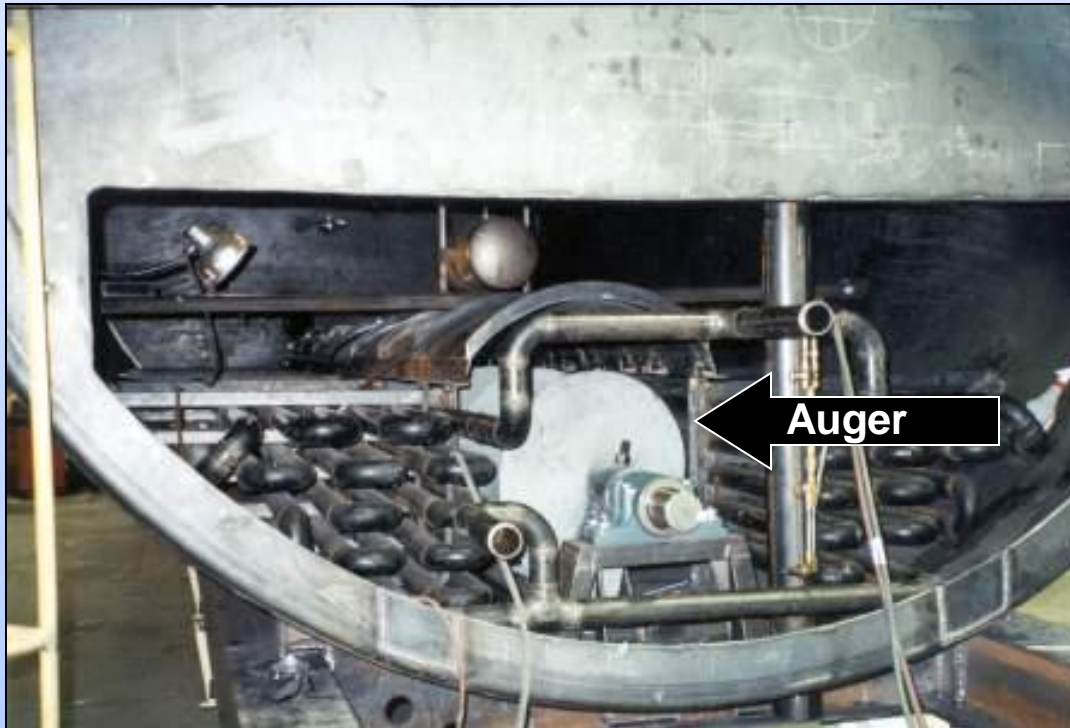


Examples of Blending Equipment





Agitation Systems

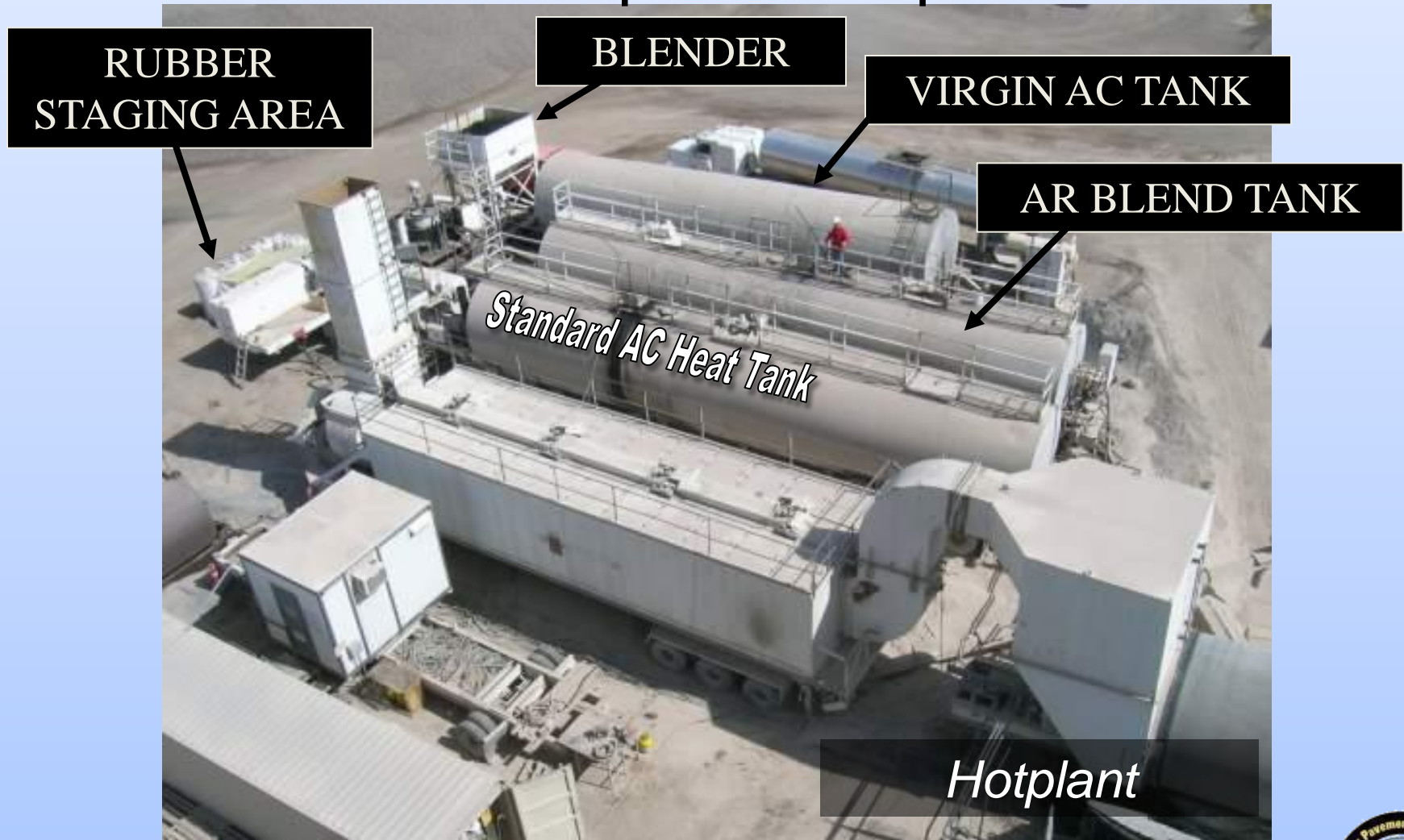


Agitation Systems

Maintaining Heat and Agitation is Key



An aerial view of a portable Asphalt-Rubber Plant setup at a Hotplant.



Meter / Pump is interlocked with Hotplant



Meter / Pump is interlocked with Hotplant





AR Paving is done with conventional paving techniques.





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PLACING AC WITH AR BINDERS

- Don't pave in the cold but AR performs well in the cold
- No use of pneumatic rollers
 - “Rubber picks up Rubber”
- Elevated mix temperature is not solution
- Use of limewater in some areas





**Some
Days
Are
Better
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Warm Mix Benefits

- Reduced Energy Consumption
- Better Performance of Mixtures
- Reduced Green-House Emissions
- More Effective Compaction
- Improved Ride Quality
 - Less Swelling of Rubberized Crack Sealant
 - Less Bumps from Thermal Segregation
- Safer Working Conditions



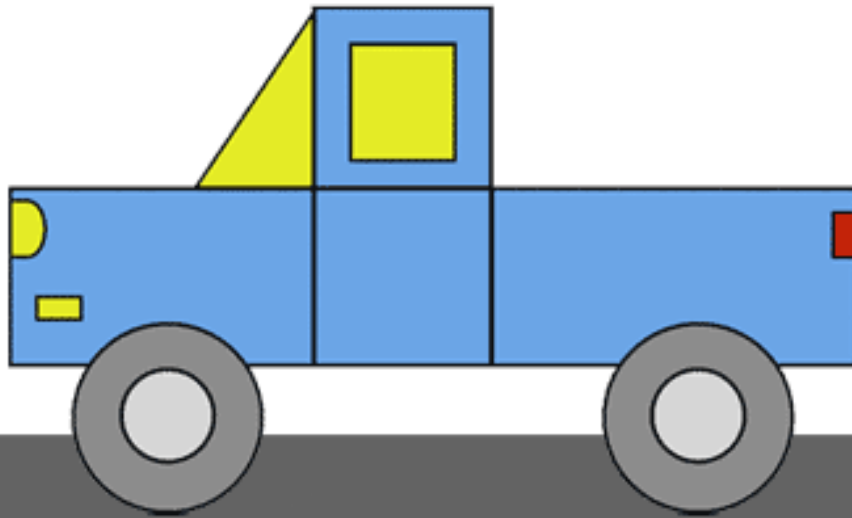
Use of Warm Mix Admixtures with Rubberized Asphalt Mixtures

Better Workability of the HotMix Allows

- Compaction Aid for Stiffer Mixes
- Longer Haul Times due to wider paving window.
- Extension of the Paving Season/ Cold Weather Paving
- Reduction in Production Temperatures Reduces Emissions
 - Better Environment for Workers
 - Reduce Blue Smoke / Odor complaints
 - Reduce Recordable Emissions
- Reduction in Energy Consumption
 - Depending on mix it may be possible to save up to 30% on energy costs.
- Drain Down test may need modification with additives



“Rubber picks up Rubber”









Set the Stage for Success

- Experienced Binder Designer
- Experienced Mix Designer
- Blender / Hot Plant Compatibility
- On-site contractor quality control
- Knowledgeable Agency inspection



Common Sense Best Practices

- Tarp loads
- Shorten windrows when paving with bellys
- Keep rollers close
- Weather forecast
 - Wind
 - Long range outlook
- Nighttime temperatures



Constructability vs. Performance



Constructability vs. Performance



Constructability vs. Performance



Constructability vs. Performance



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Constructability vs. Performance



Performance in Indio, CA



Performance in Indio, CA



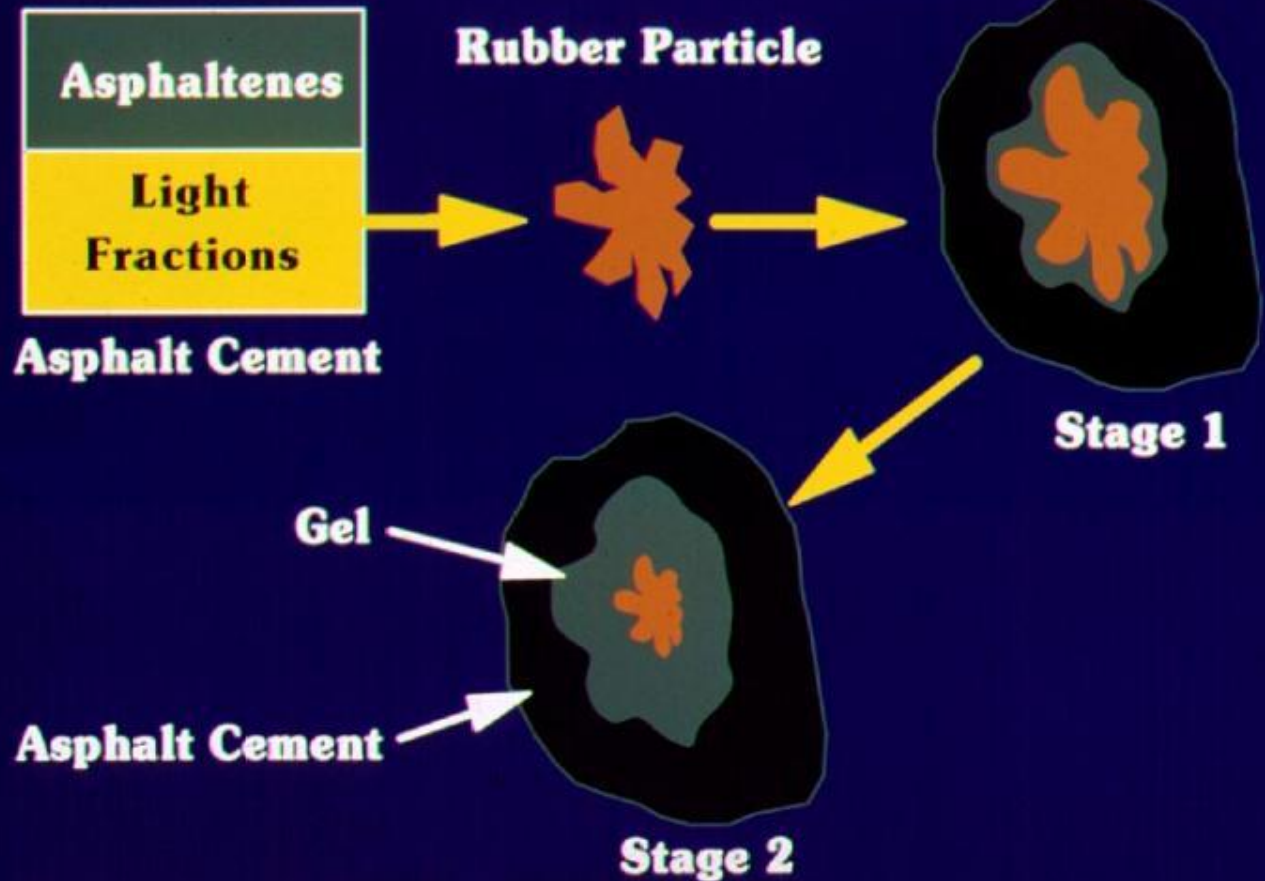






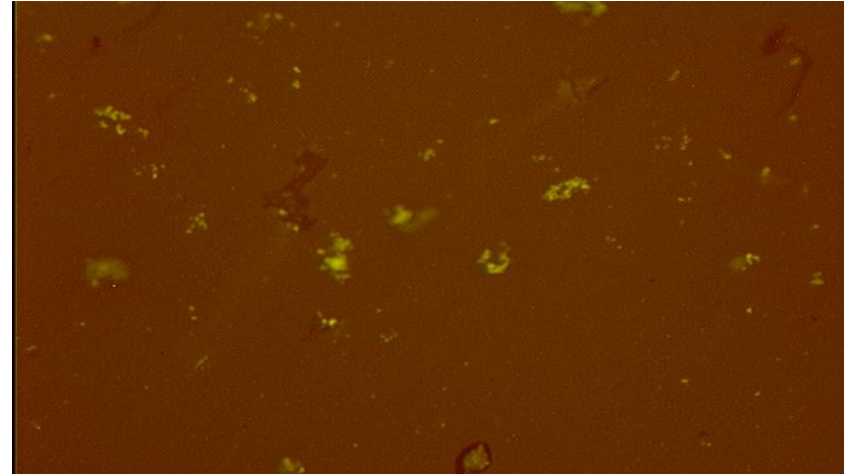
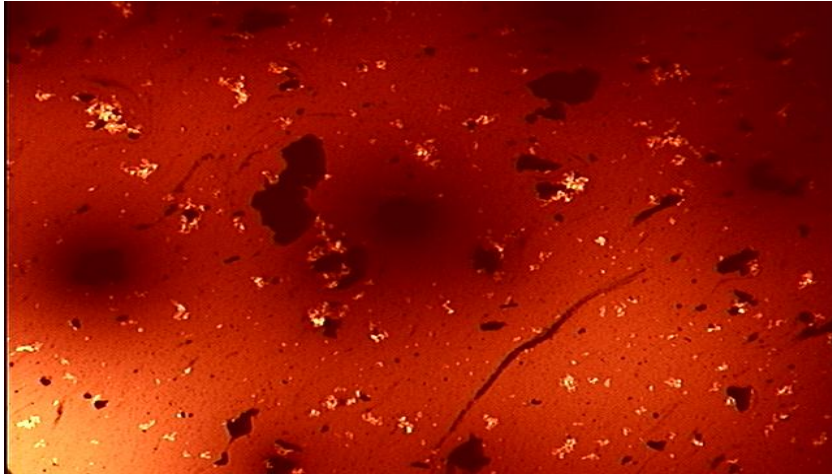


Reaction Stages of Asphalt & Rubber



Photomicrographs of CMCRA

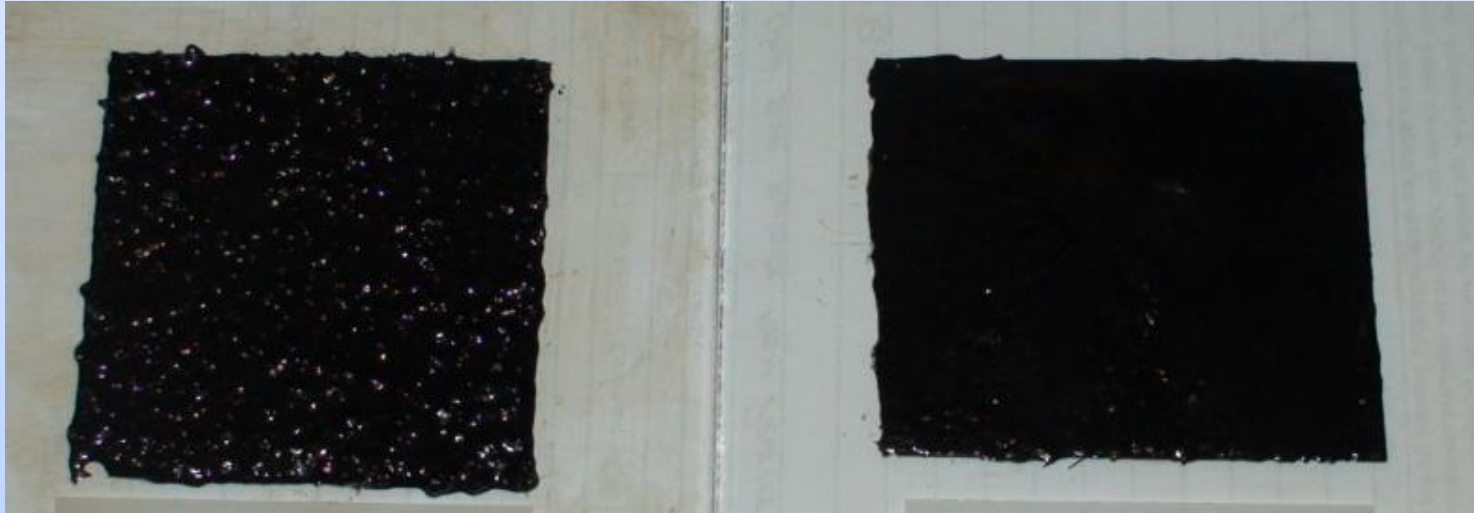
Transmitted and Fluorescent Light



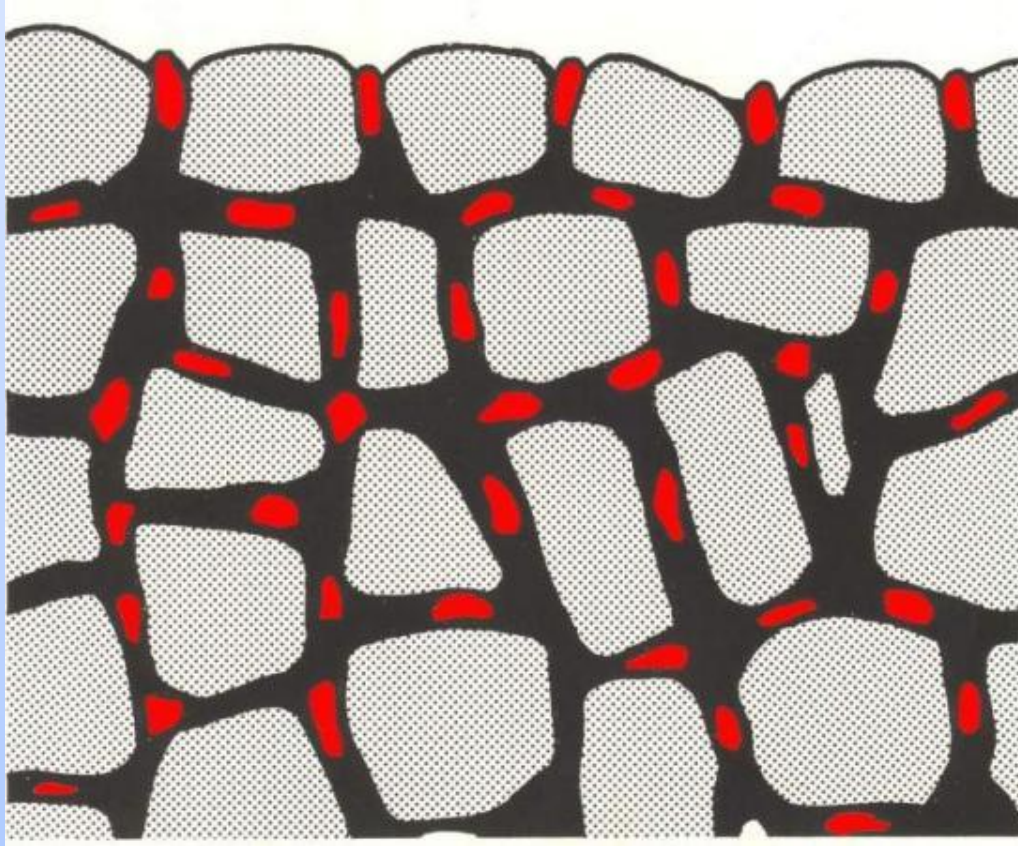
AR “Gel”



Difference with and without Particulate Rubber

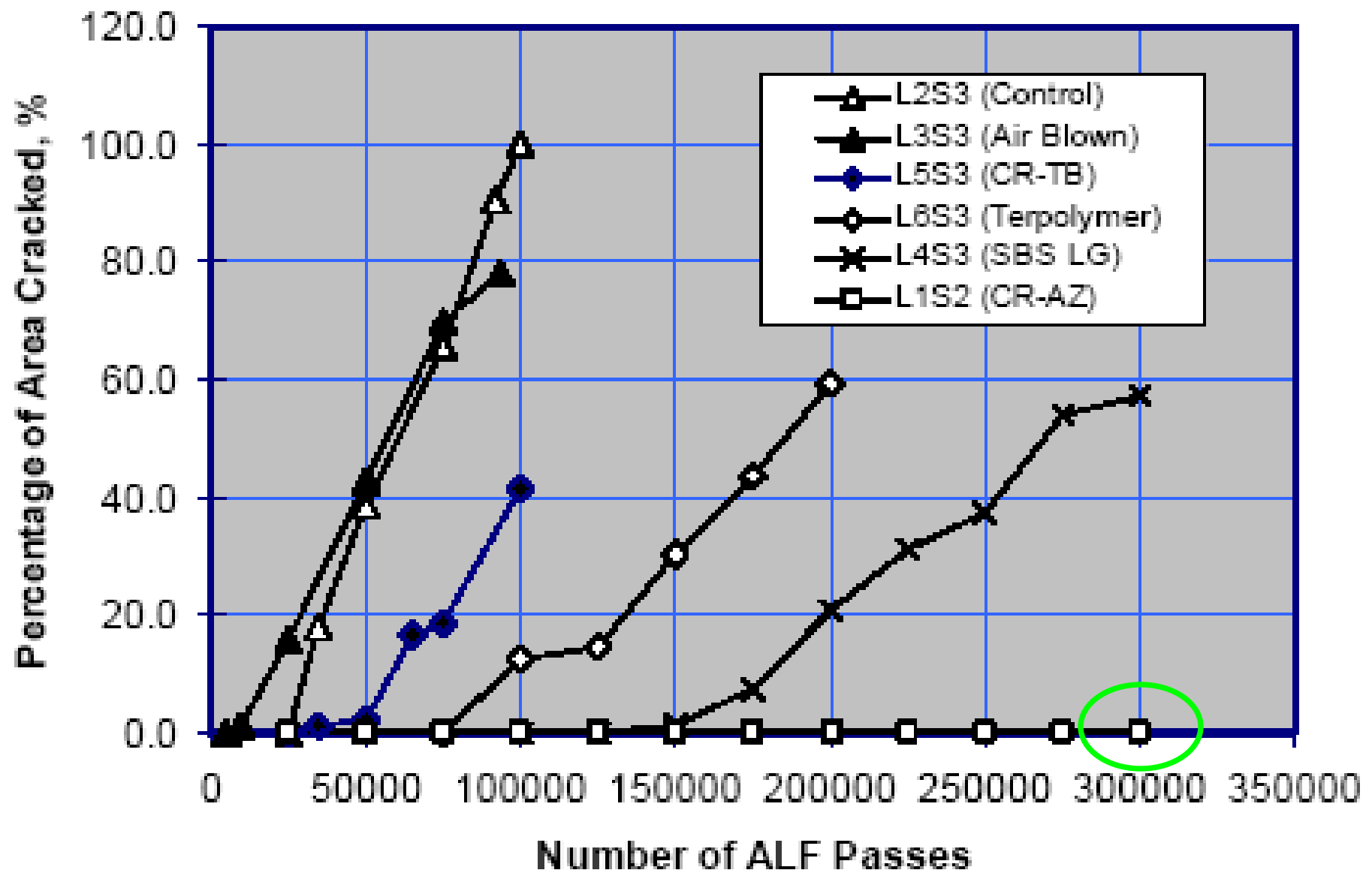


Why it works -
22,937,600 rubber particles per ton of mix help fight
cracking

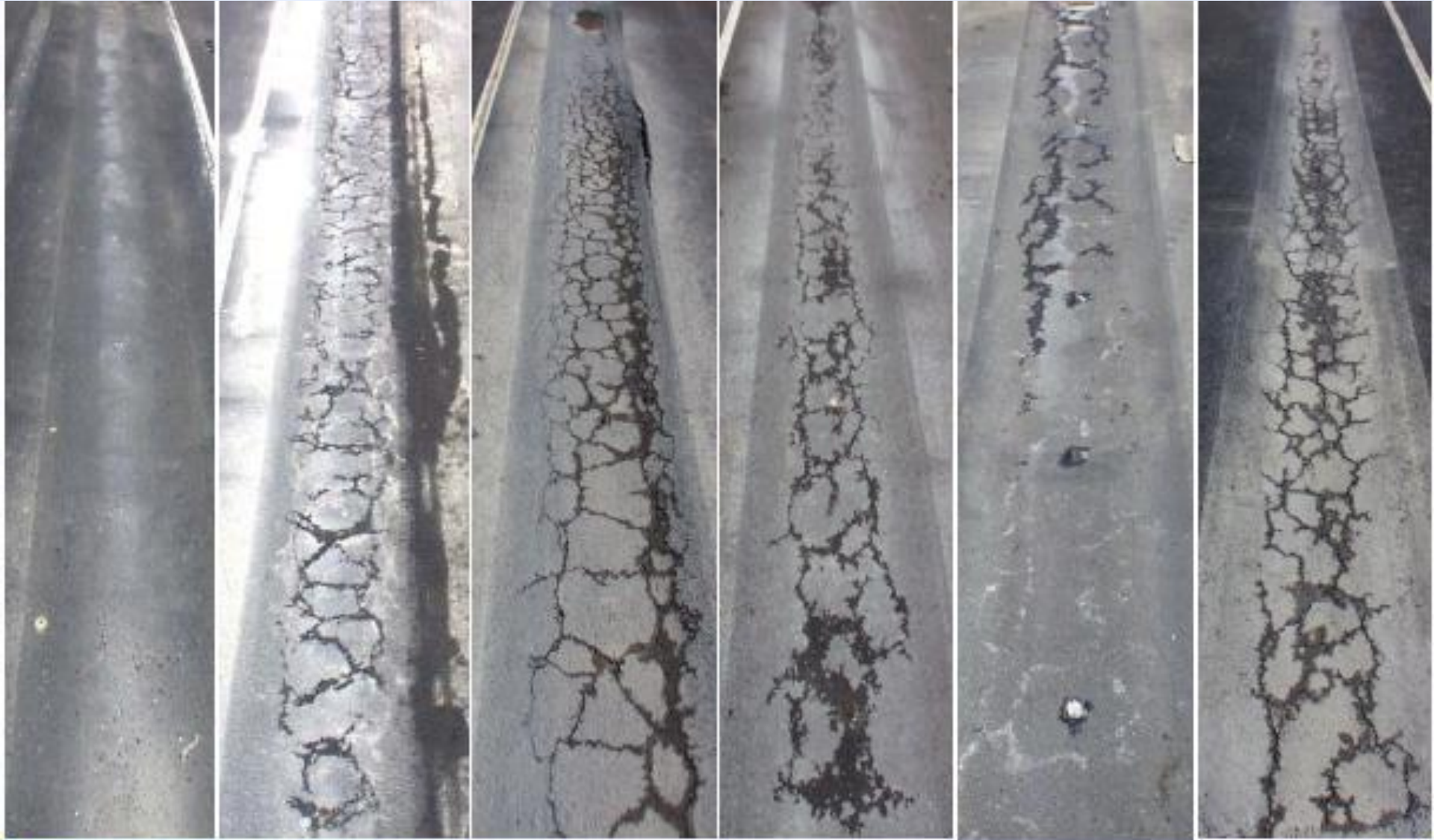


Two ALF's with
12 Pavement Lanes Constructed in
the Summer and Fall of 2002





Percentage of Area Cracked vs. ALF Wheel Load Passes



Lane 1	Lane 2	Lane 3	Lane 4	Lane 5	Lane 6
CR-AZ	Control	Air Blown	SBS LG	CR-TB	TP
300,000	100,000	100,000	300,000	100,000	200,000

Summary

- Asphalt Rubber are very cost effective in right application
- Constructability issues must be managed
- Potential to use large amounts of scrap tires to beneficial use



Questions?



“I know you believe you understand what you think I said, but I am not sure you realize that what you heard is not what I meant.”

---Alan Greenspan

