

15th Annual Arizona Pavement/Materials Conference

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Arizona State University

Tempe Arizona

Scrap Tire Recycling and the Use of Recycled Tire Rubber
In Arizona

Dawn Helms, CRM / Jeff Smith, Cactus Asphalt

WASTE TIRE RECYCLING IN ARIZONA

A PUBLIC/PRIVATE PARTNERSHIP

Dawn Helms
CRM of America, LLC

Introduction

- ▣ Arizona's Model Waste Tire Program
- ▣ By The Numbers
- ▣ Components of a Successful Program
- ▣ Vibrant Industry

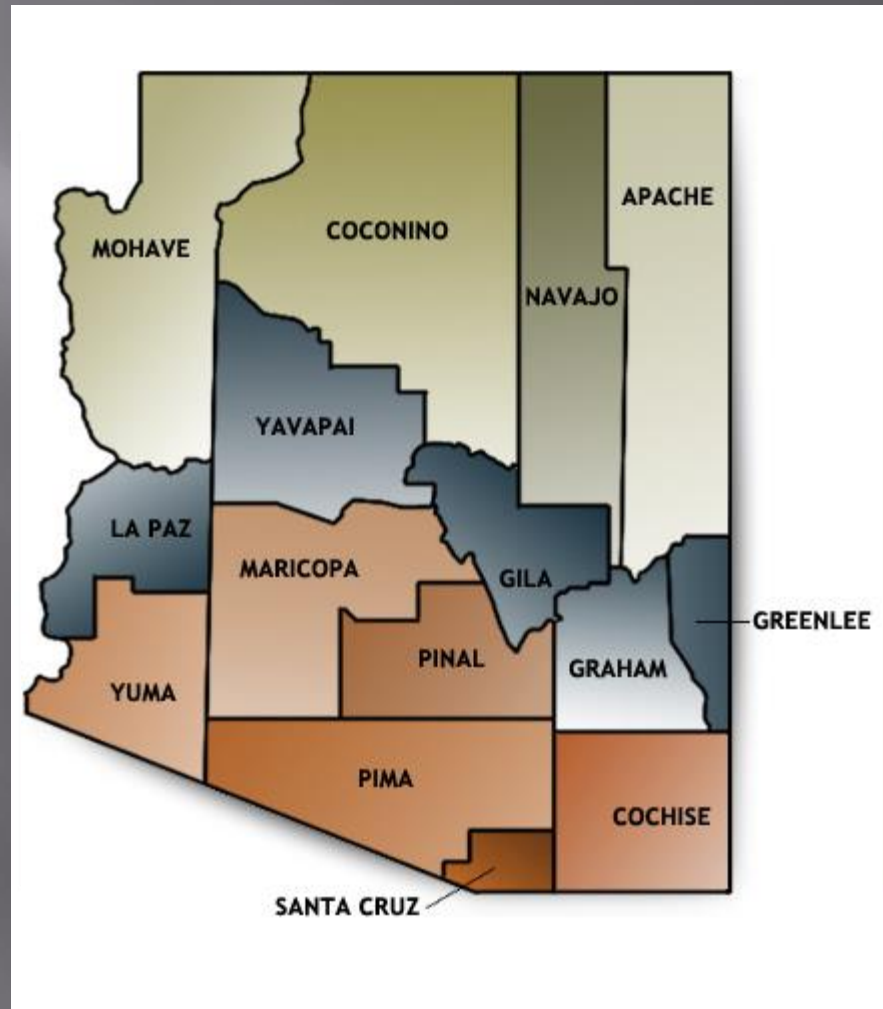
Arizona Waste Tire Laws & Program Fees

- AZ generates approx. 13 million scrap tires per year
- \$2.00 recycling fee for each tire purchased
- Tire retailers keep \$.10 per tire to cover record keeping
- DEQ receives 3.5% per year to enforce the tire laws
- Remaining funds distributed to counties based on registered vehicles
- Each County must build and maintain a Waste Tire Collection Site
- Disposal programs determined and administered by the counties

Tires Recycled at CRM by County in 2017

- Apache - 20,000
- Cochise - 150,000
- Coconino - 140,000
- Gila - 75,000
- Graham - 40,000
- Greenlee - 5,000
- La Paz - 113,000
- Maricopa - 6,700,000
- Mohave - 308,000
- Navajo - 104,000
- Pinal - 250,000
- Pima - 1,400,000
- Santa Cruz - 110,000
- Yavapai - 250,000
- Yuma - 335,000

- TOTAL: 10,000,000



Let's Do the Math

- ▣ Total of waste tires for recycling 10,000,000 PTE's (Passenger Tire Equivalent)
- ▣ Total PTE's generated in AZ per year 13,000,000 PTE's
- ▣ Difference is approx. 2,000,000 PTE's out of the system - culled and sold as used tires
- ▣ Fun Fact: 10 Million PTE stretches approx. 4,735 miles or approx. half way around the earth

What Makes a Successful Waste Tire Management Program?

- Closed Loop Partnerships
- Industry Expertise in Manufacturing Methods and Logistics
- Market Development
- Product Diversification
- Commitment to Environmental Stewardship

Closed Loop Partnerships

- Closed loop partnerships support a common environmental responsibility goal
 - A strong waste tire management program (Collection)
 - A strong waste tire recycling program (Recycling)
- The last chain in the closed loop process is purchasing
 - The use of the recycled waste tires as crumb rubber in products such as asphalt rubber and artificial turf infill

CRM of America Mesa Arizona

- ▣ State-of-the-art recycling/ manufacturing facility with the largest capacity in Northern America
- ▣ Utilizes varied processing methods to meet customers crumb rubber requirements; ambient and cryogenic production
- ▣ Industry expertise in waste tire recycling, manufacturing, technology, marketing, and logistics
- ▣ A company mission of environmental stewardship

CRM of America...Arizona's Tire Recycler ... the basic component of a successful waste tire recycling program

120,000 sq. ft. plant on 40 acres in East Maricopa County



Mobile Arizona Before



*AmericanRecycler.com by Irwin Rapoport
(NOV 2008)*

**Arizona tire pile problem
remains unresolved**

**“The Arizona
Department of
Environmental Quality
has now passed
legislation requiring
privately-owned
facilities with more than
500 tires to submit site
plans. “**

Mobile Arizona After



Portrait of An Unsuccessful Waste Tire Management Program



“Tire Failure”

Lax rules left mountains of mosquito-infested, flammable tires in South Carolina

•By Tony Bartelme and David Wren

tbarthe@postandcourier.com

dwren@postandcourier.com

•Apr 22, 2018

El Paso, TX

Cleanup efforts at massive El Paso County tire dump a costly challenge, owner says

By: matt.steiner@gazette.com Aug 31, 2016



“Tires had piled up for more than two decades after the dump began in the 1980s. Six years ago, the dump had an estimated **30 million tires** in stacks above ground and buried 30 feet underground”.

Colorado's Tire Mountain

“The Midway Tire Monofill is the second largest in Colorado, which has three such dumps.

A facility, owned by CH2E in Hudson is the biggest, Gaboriau said.

The third monofill in Colorado is run by Resources Management Co. and is located in Julesburg.

Gaboriau said CDPHE estimates the three facilities combined are filled with more than **60 million tires.**”

Waste Tire Recycling is more than an environmental program, it has become a

VIBRANT INDUSTRY

Adding Millions to Arizona's economy with.....



JOBS



**TRANSPORT
WORK**



**VENDOR
REVENUE
SUPPLIER**



RESEARCH



**TECHNOLOGY
TRANSFER**

RECYCLED TIRE RUBBER USE IN ARIZONA

Jeff Smith
Cactus Asphalt

**Charlie
McDonald
and
A-R “Band-aid”
Circa 1966**



Early Asphalt-Rubber Binder Mixing – Circa 1972



Early Spreader Truck Technology – Circa 1973



Next Generation Rubber Blending Technology – Circa 1992



New Spreader Truck Technology

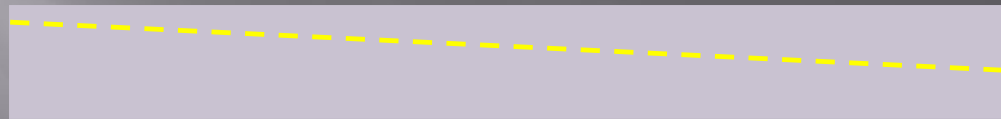


RTR Use in Arizona

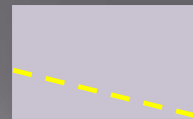
SAM



SAMI



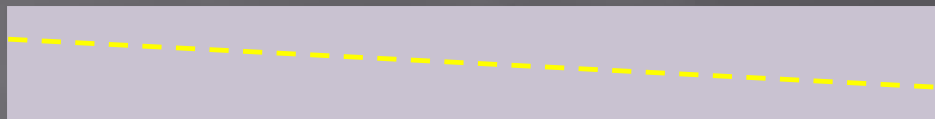
**DENSE-GRADED
HOT MIX**



**OPEN GRADED
HOT MIX**



**GAP GRADED
HOT MIX**



Recap Current Rubber Use for Pavement Preservation Applications in Arizona

- ▣ SAM (Chip Seal /LV and HV FAST)
- ▣ SAMI (Interlayer)
- ▣ Cape Seal (Slurry, Micro and Premium Seal Coat)
- ▣ Hot Mix (Gap and Open Grade)
- ▣ Scrub Seal (Hot Applied)
- ▣ Four Binder Materials Available (Arizona Rubber)
 - Polymer Modified Asphalt Rubber
 - Asphalt Rubber
 - Rubberized Asphalt Binder
 - Rubberized Asphalt Scrub Seal

SAM (FAST)



SAMI



Cape Seal – (Slurry Seal / Micro)



Cape Seal (Premium Seal Coat)



Hot Applied Scrub Seal



Gap/Open Graded Hot Mix



Binder Materials That Contain Arizona RTR

POLYMER MODIFIED ASPHALT RUBBER

*Usually 82 to 85 Percent of PG Asphalt Cement
and*

*15 to 18 Percent of 12 to 14 Mesh CRM and Fine Grind SBS
Polymer Combination*

FAST Application Rates

PMAR Binder - .60 to .75 Gallons Per Square Yard

3/8" to 1/2" Aggregate - 26 to 32 Pounds Per Square Yard

ASPHALT-RUBBER BINDER

*Usually 80 to 85 Percent PG Asphalt Cement
and*

*15 to 20 Percent of 12 to 14 Mesh CRM or a Combination of
CRM and High Natural Rubber*

FAST Application Rates

A-R Binder - .55 to .75 Gallons Per Square Yard

3/8" to 1/2" Aggregate - 26 to 36 Pounds Per Square Yard

Currently Utilized as a Hot Mix Binder

RUBBERIZED ASPHALT BINDER

* EQUAL / ALTERNATE TO SOLUBOLIZED BLEND (TR OR PGTR+)

*Usually 89 Percent PG Asphalt Cement
and*

*11 Percent of Fine Grind CRM and Fine Grind SBS Polymer
Combination*

FAST Application Rates

RAB Binder - .30 to .50 Gallons Per Square Yard

1/4" to 3/8" Aggregate - 18 to 28 Pounds Per Square Yard

Has been utilized as a Hot Mix Binder

RUBBERIZED ASPHALT SCRUB SEAL BINDER

* *PREPATORY SEAL OR MASSIVE CRACK FILLER PRIOR TO SURFACE TREATMENT*

*Usually 86 to 90 Percent of a Low Penetration Asphalt
Cement*

and

*10 to 14 Percent of a Fine Grind CRM and SBS Polymer
Combination*

Application Rates

Binder - .20 to .50 Gallons Per Square Yard

Aggregate or Sand - None Required

Landfill to Road Use

- ▣ Mohave County
- ▣ Maricopa County
- ▣ City of Glendale

A cylindrical core sample of asphalt concrete is shown against a grey background. The sample has a dark, textured surface with visible aggregate particles. A prominent vertical crack runs down the center of the cylinder, splitting it into two halves. The top surface is slightly uneven and has a yellowish tint. The word "Questions?" is written in bold yellow text across the middle of the sample.

Questions?