

Industry Overview

Earth Day 2008
Steven Muncy, ARRA

Next Fuel- 20 Light Yrs



EPA Report

- ▶ **RAP is the most recycled material**
 - **By Weight**
 - 100.1 million tons produced
 - 80.3 million tons recycled
 - **By Percent - 80% recycled**

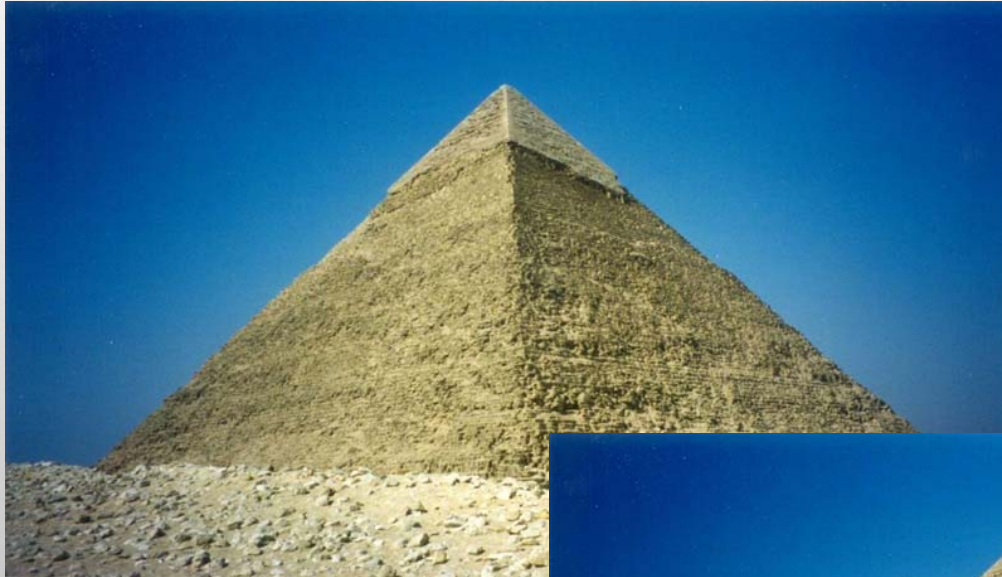
Where is it?

- ▶ **20 Million Tons**
- ▶ **20% of available RAP**

How Much?



How Much?



x2



RAP = \$\$\$



RAP Value

14.95

Aggregates 10.00



Asphalt 100.00



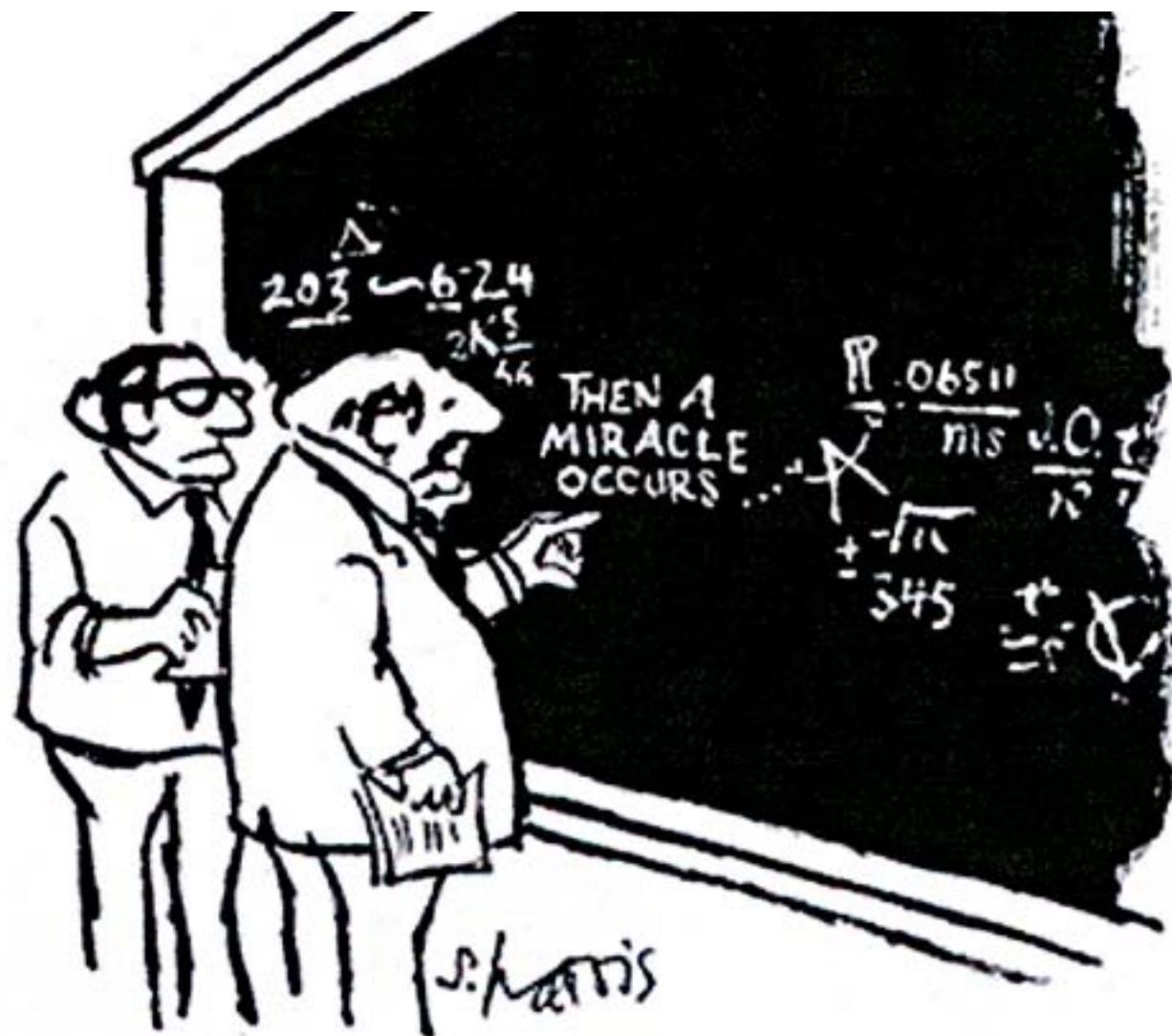
The FHWA Policy:

- ▶ **Recycling and reuse can offer engineering, economic and environmental benefits.**
- ▶ **Recycled materials should get first consideration in materials selection.**

**- Frederick G. Wright, Jr.
Former Executive Director**

We must

- ▶ **Recycle More**
- ▶ **Recycle More Efficiently**



"I THINK YOU SHOULD BE MORE EXPLICIT HERE IN STEP TWO."

Earth Day 2008



BARM

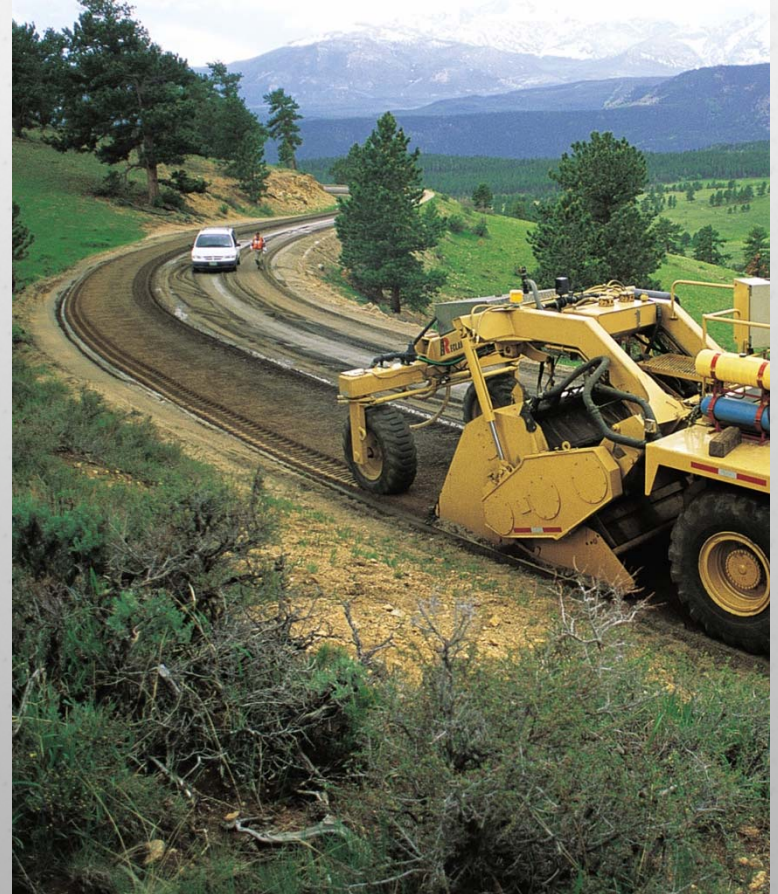


Full-Depth Reclamation



Comparison

- ▶ **FDR penetrates completely through the existing asphalt layer and into the underlying layers.**



FDR Process

► **Core Equipment**

- **Road Reclaimer**

- **Motor Grader**

- **Compactors**

- **Water Truck**



Chemical Stabilization

► **Uses one or more of the following**

- **Portland Cement**
- **Lime**
- **Fly Ash**
- **Kiln Dust**
 - **Cement (CKD)**
 - **Lime (LKD)**
- **Calcium Chloride**
- **Other chemical products**

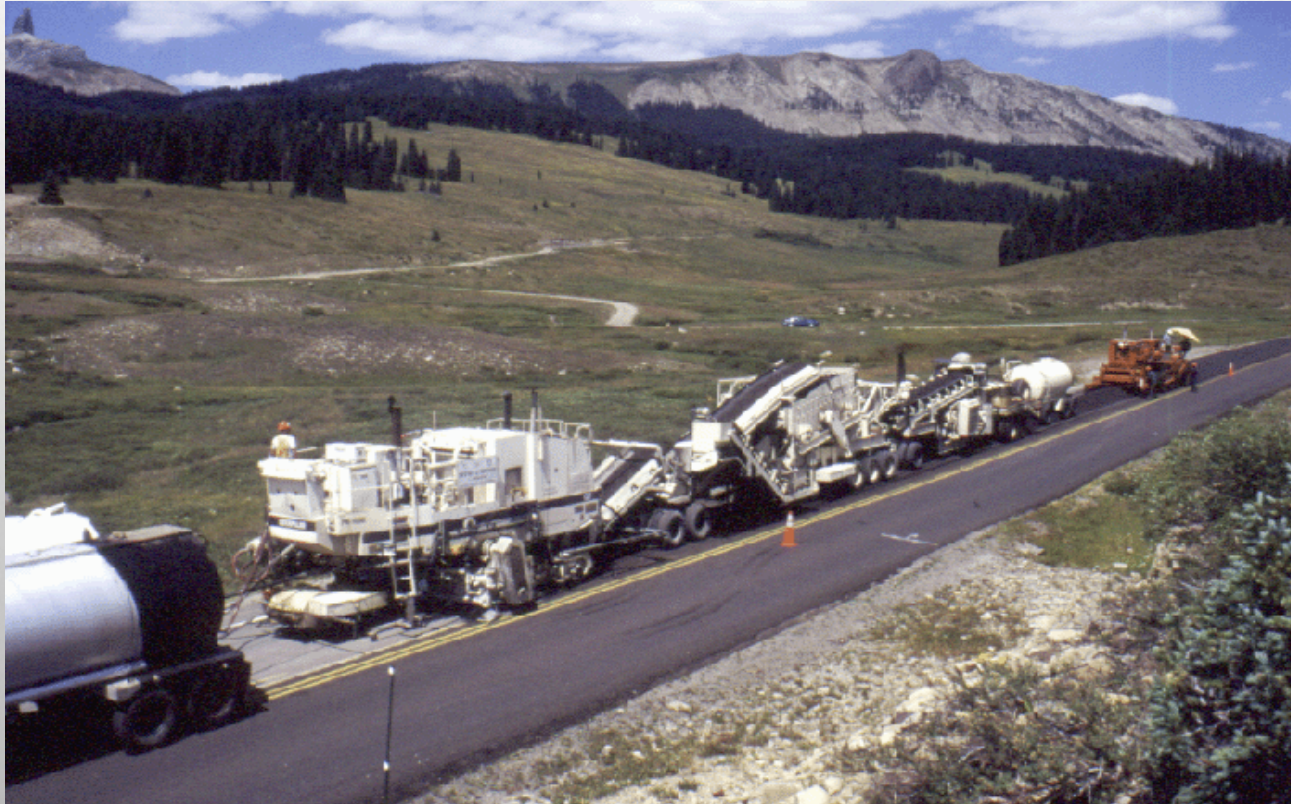


Asphalt Stabilization

- ▶ **Asphalt additives**
 - **Emulsified Asphalt**
 - **Foamed/Expanded Asphalt**



Cold In-Place Recycling



CIR – Process Description

- ▶ **Pulverizing existing pavement (2-5")**
- ▶ **Sizing of the reclaimed asphalt**
- ▶ **Addition of new binder/additives**
- ▶ **Mixing all component materials**
- ▶ **Placement/compaction of the mixture**



CIR – Multi-Unit Train



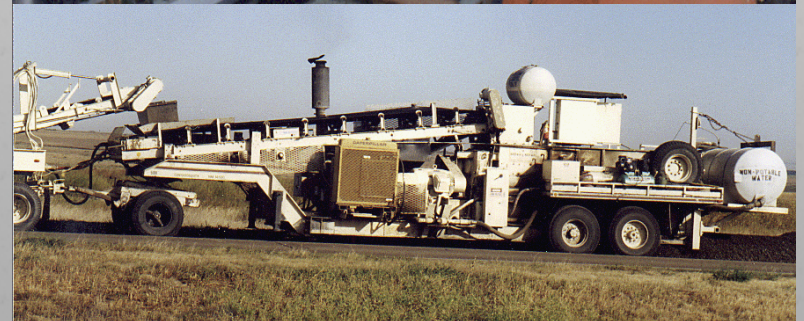
Multi-Unit Sizing

- ▶ Reclaimed asphalt pavement (RAP) is screened to a maximum size requirement.
- ▶ Oversized material is crushed and returned to the screen deck for total control.



Multi-Unit Pugmill

- ▶ Belt scale weighs RAP, computer controls additives
- ▶ Multiple additives may be added
- ▶ Pugmill blends RAP and additives



Single Unit Train

- ▶ Small size for urban projects
- ▶ Short turning radius



CIR - Laydown

- CIR uses the same equipment and controls as other mixes.



Hot In-Place Recycling



What is HIR?

- ▶ **Hot In-Place Recycling (HIR) is an on-site, in-place, pavement rehabilitation method that consists of heating, scarifying, softening, mixing, placing and re-compacting the existing bituminous pavement.**

Types of HIR

- ▶ **Surface Recycling**
- ▶ **Surface Repaving**
- ▶ **Remixing**

Hot In-Place Recycling

- ▶ **Treats surface to a depth of 1 inch or greater**
- ▶ **Allows several different surface treatments to be added during or after the HIR process**
- ▶ **Adds additional binder/modifier**
- ▶ **Adds additional hot mix asphalt**
- ▶ **Increase structural coefficient**

HIR Process



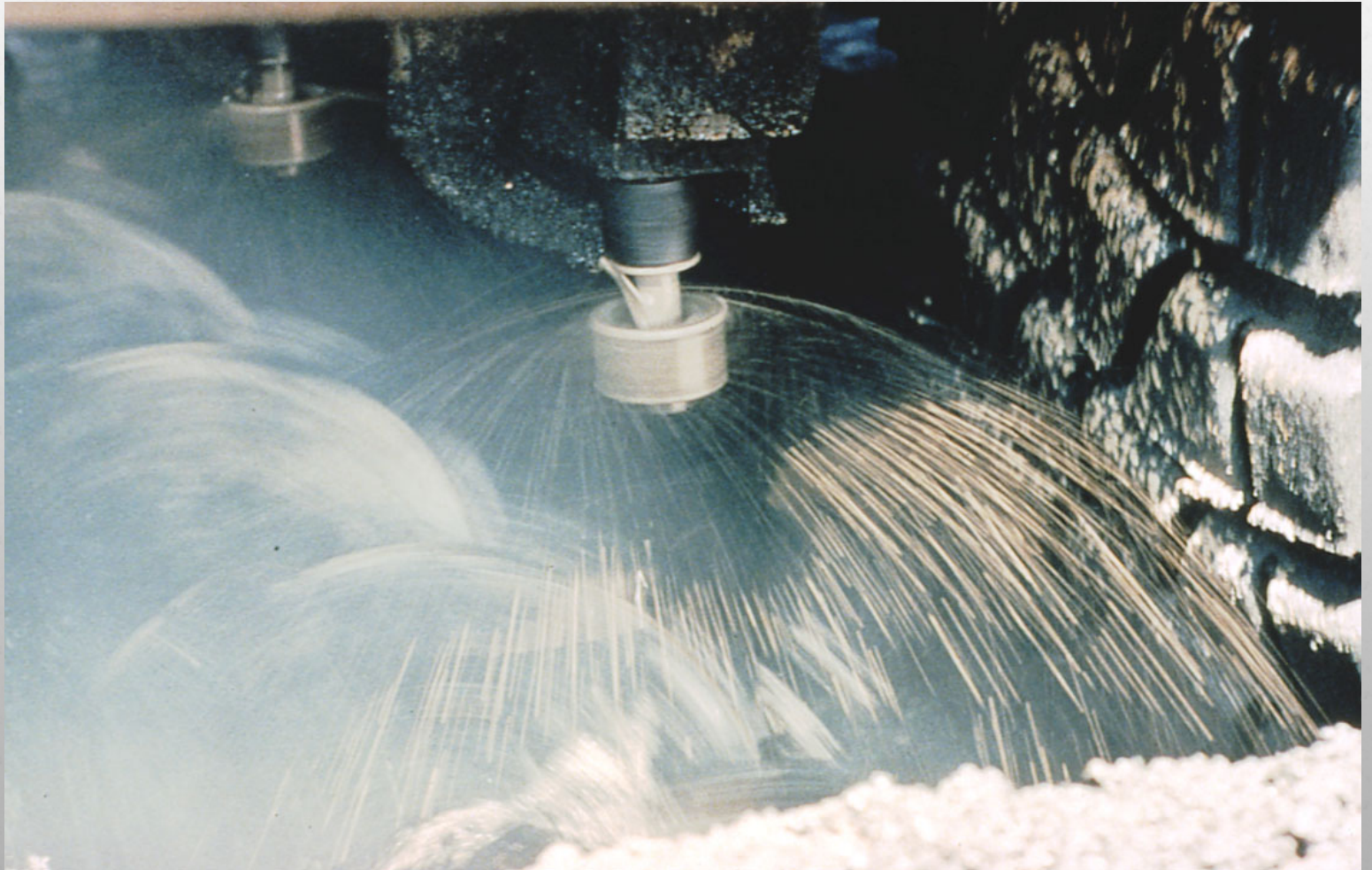
HIR Heating



HIR Scarification



HIR Additives



HIR Placement



Recycling Candidates

- ▶ **Airport Runways**
- ▶ **County Roads**
- ▶ **State & US Highways**
- ▶ **Interstate Highways**
- ▶ **City Streets**



Project Selection

- ▶ **Material Properties Evaluation**
- ▶ **Existing Road Geometrics**
- ▶ **Life Cycle Cost Analysis**
- ▶ **Environmental Impact**
- ▶ **Structural Strength**
- ▶ **Pavement Condition**
- ▶ **Road History**
- ▶ **Traffic Study**



QA / QC Plan

1. Calibration of meters
2. RAP Gradation
3. Recycling Additive
4. Recycled Mat Smoothness
5. Moisture added to RAP
6. Compacted Density
7. RAP Gradation
8. Moisture content before overlay
9. Recycling additive content
10. Depth of pulverization/milling



Typical Surface Treatments

- Chip Seal
- Slurry Seal
- Micro-Surfacing
- Cape Seal
- Cold Mix Overlay
- Hot Mix Overlay



In-Place Benefits

- ▶ **Conserves Energy**
- ▶ **Conserves Materials**
- ▶ **Improves Mix Characteristics**
- ▶ **Cracking Eliminated/Reduced**
- ▶ **Improves Geometrics**
- ▶ **Cost Effective**
- ▶ **Saves Time**
- ▶ **May Be Performed Under Traffic**

