

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**

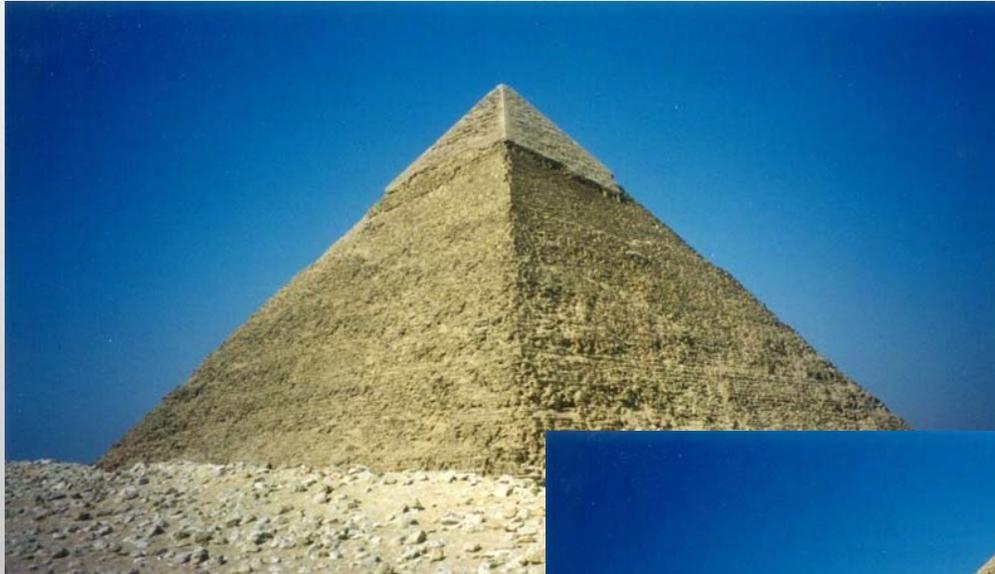
Where is it?

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

How Much?



How Much?



x2



RAP = \$\$\$



RAP Value

14.95

Aggregates 10.00



Asphalt 100.00



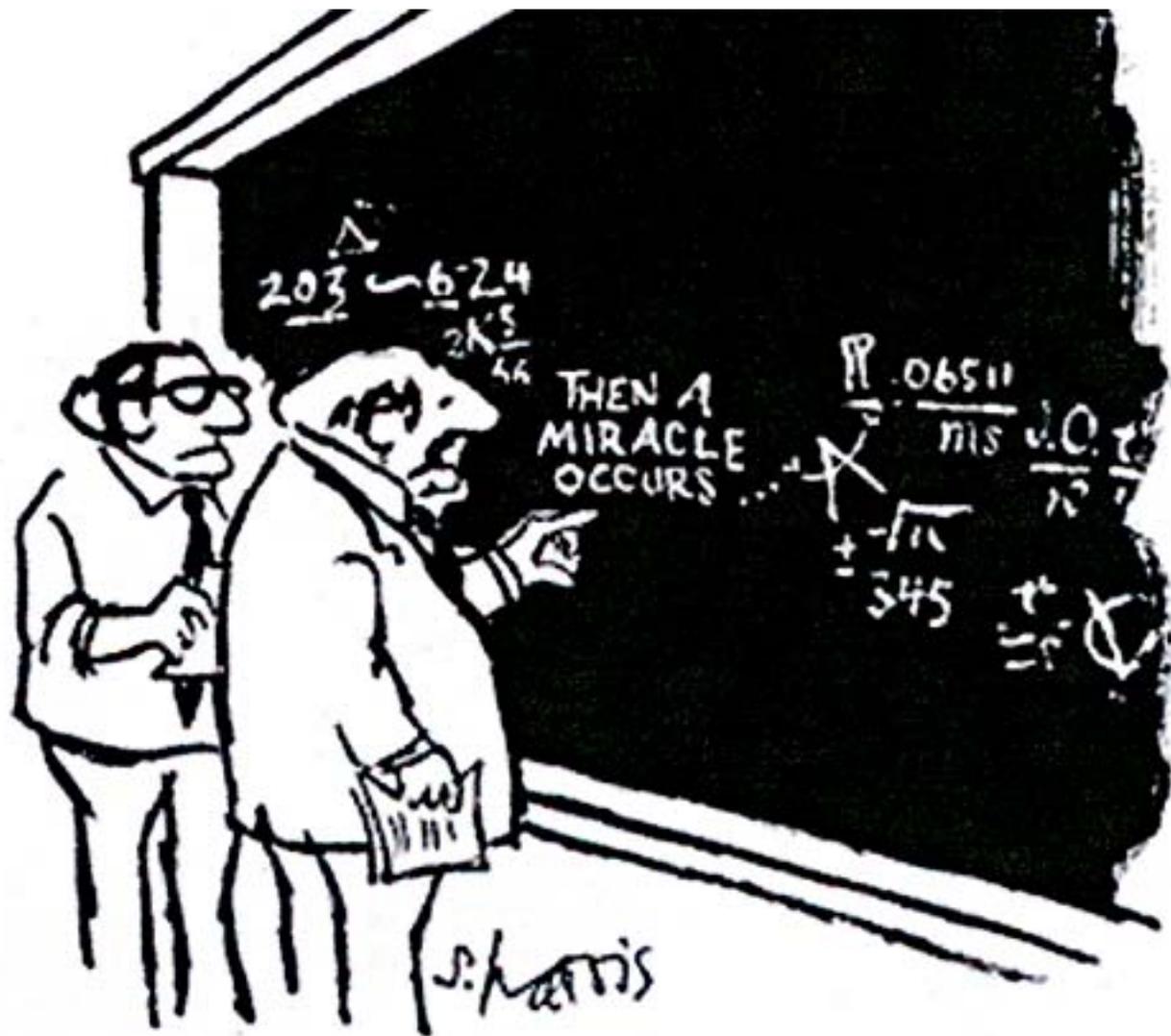
The FHWA Policy:

- ▶ **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**

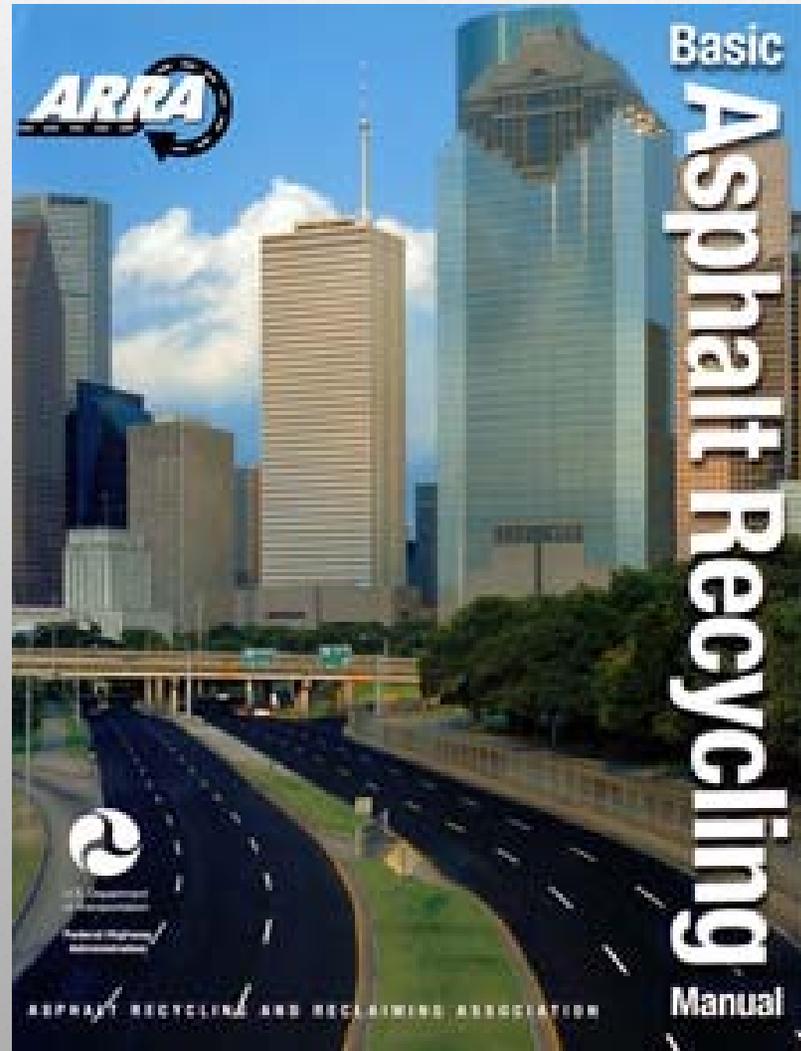


"I THINK YOU SHOULD BE MORE EXPLICIT HERE IN STEP TWO."

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BARM

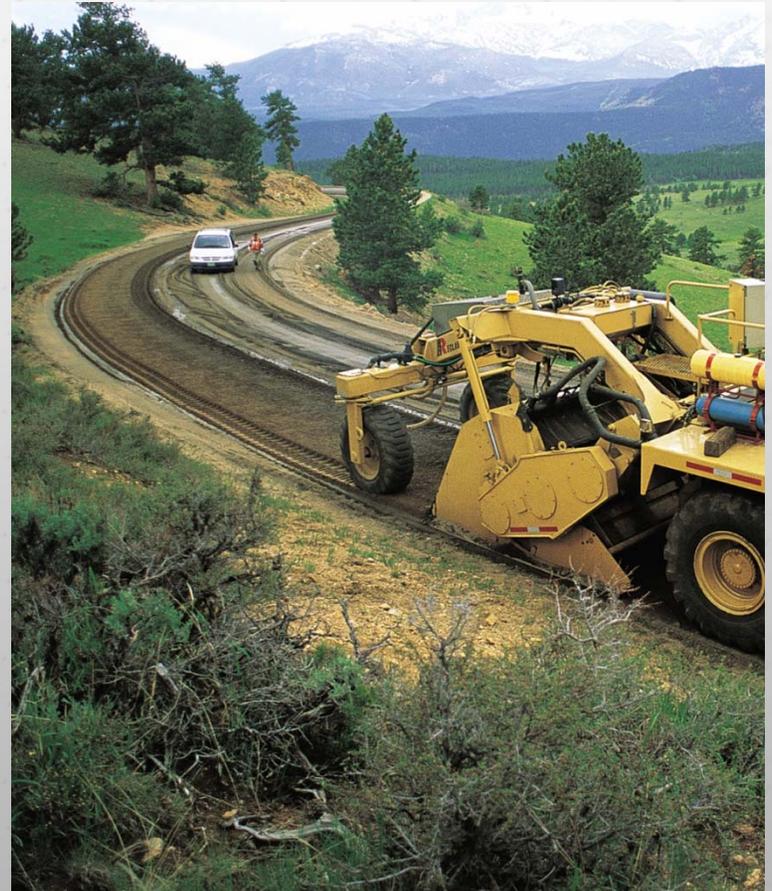


Full-Depth Reclamation



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**

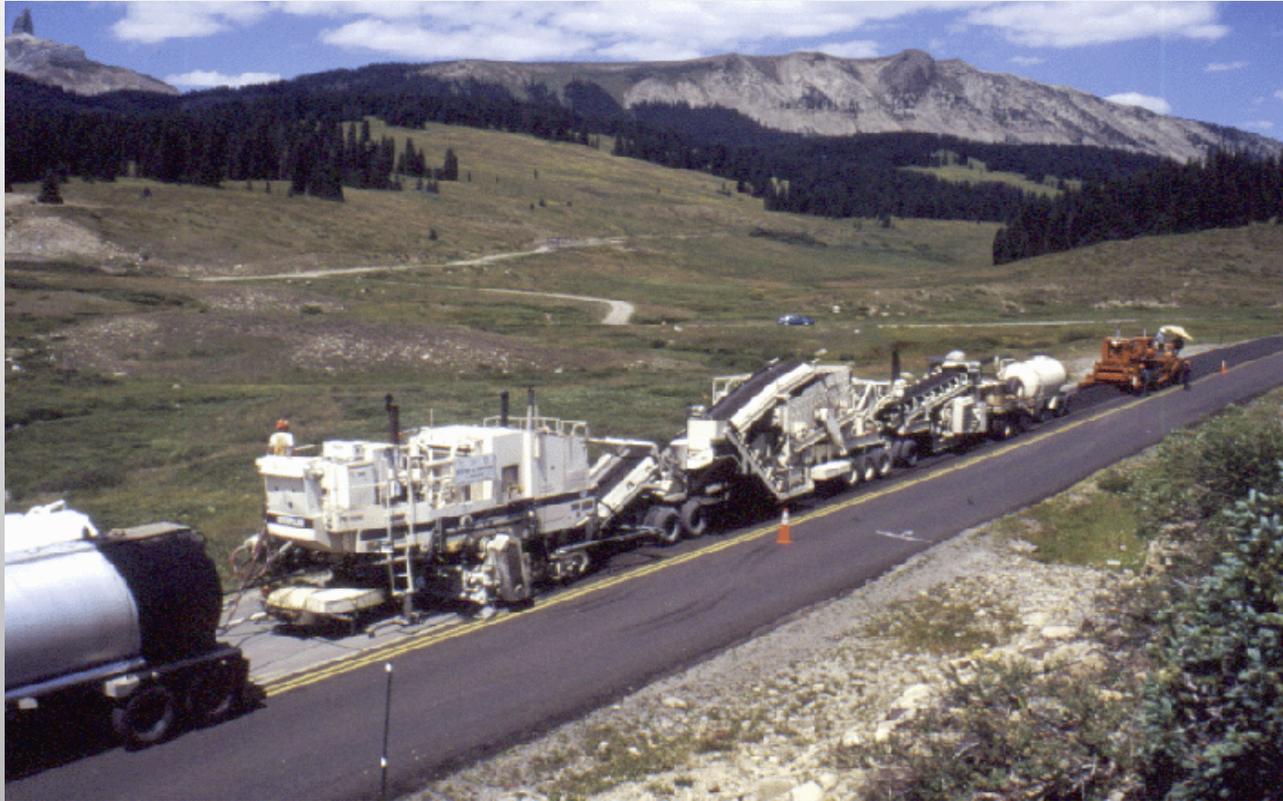


Asphalt Stabilization

- ▶ **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



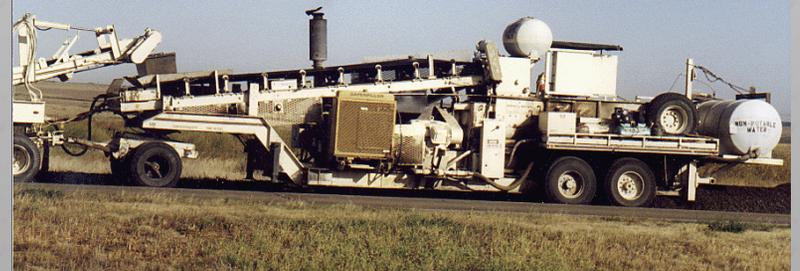
Multi-Unit Sizing

- ▶ 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**



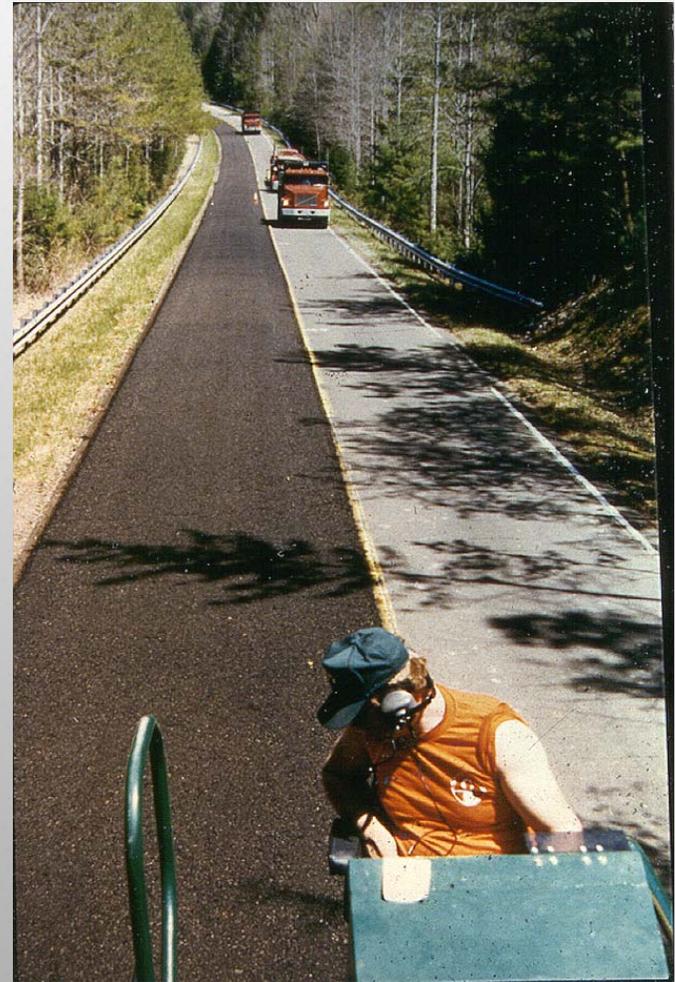
Single Unit Train

- ▶ 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**

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