Higher RAP Contents: Best Practices for Processing/Handling

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Increased RAP Contents

- Economic and environmental pressures
- Interest in using *more* RAP in more *mixes*
- AASHTO specifications allow easy use of up to 25% RAP
  - Can go higher with more testing
  - Some states do not allow higher percentages or use in some types of mixes

Ongoing work

- NCHRP 9-46, *Improved Mix Design, Evaluation and Materials Management of High RAP Content HMA (NCAT)* - completion 2010
- FHWA Funded, *Development of High RAP Content Mix Guidelines and Informational Documents* (NCAT/ NCSC/UNH) – completion 2010
- FHWA HMA Recycling ETG – ongoing
- Other state studies ongoing
- All will offer more guidance.

RAP mixes can perform as well as or better than virgin mixes.

So, what can you do to help ensure success?

Some Keys to Success

- Processing the RAP
- Stockpiling the RAP
- Control during production


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Milling

- Removes old/distressed pavement
- Eliminates costly shoulder work
- Maintains drainage features
- Valuable rehab option


What to do with the RAP?

In GOK Pile

After Processing

Processing RAP

- Mixed RAP can be variable
  - Crushing/Screening to break up clumps
  - Processing can improve uniformity
  - Uniformity essential to meet specifications

Fractionating RAP

- Improves uniformity (remixes)
- Allows use of different sizes to meet mix volumetrics
- Allows better control of gradation (and binder content)


Fabric Contamination


Proper care yields consistent material

Stockpiling Practices

- Avoid segregation
- Avoid contamination
- Reduce stockpile moisture

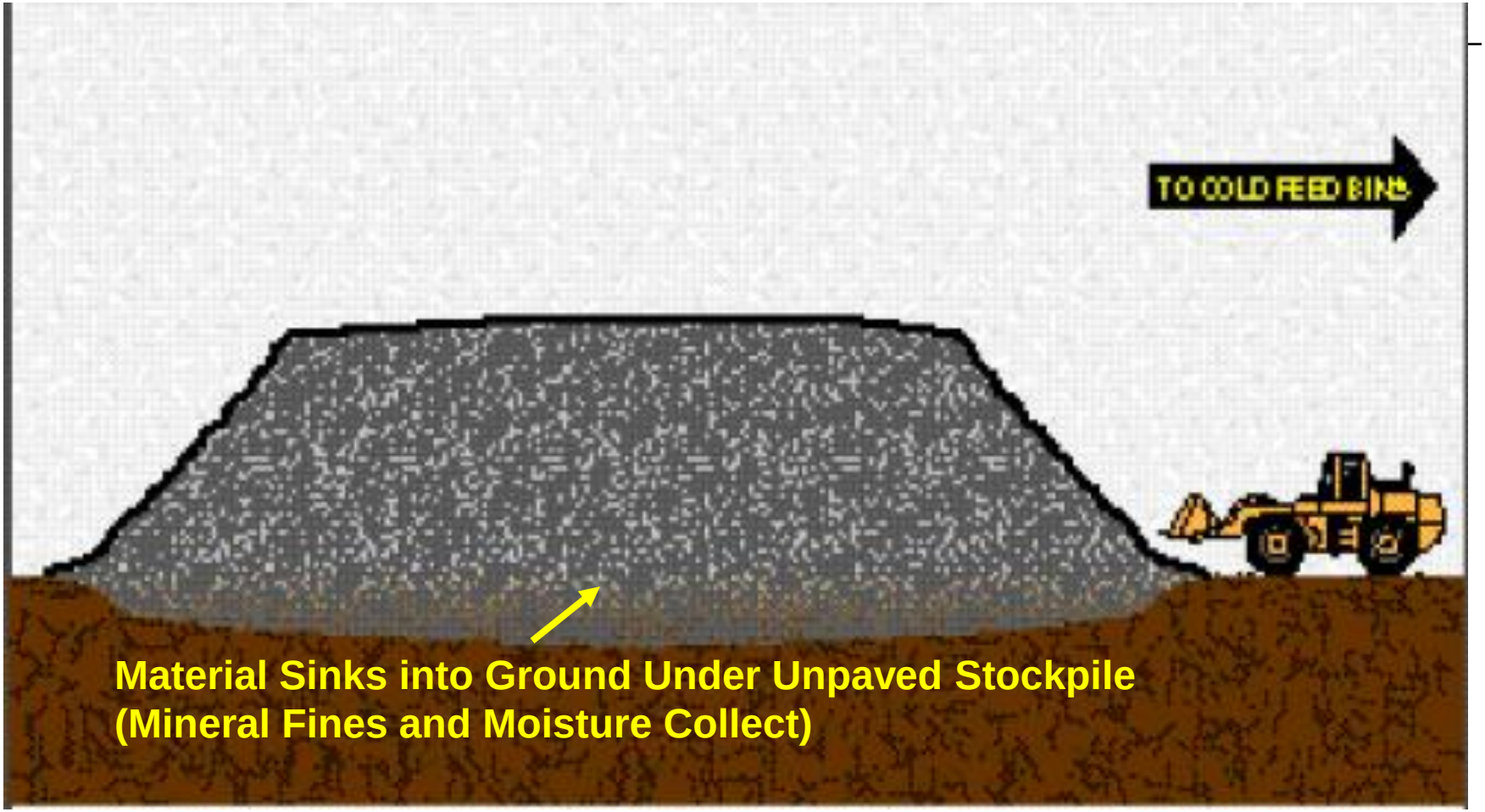
Segregation

- Follow normal stockpiling techniques to minimize segregation
  - Building
  - Managing
  - Pulling material

Contamination

- Stockpiles intermixing – spread out
- Putting wrong material in stockpile – label clearly
- “Dirty” stockpile – pave stockpile area
- Tracking mud into pile – install drainage to help keep area dry, mud off loader tires

Buried Stockpile



Reduce Stockpile Moisture

- Reduce fuel consumption and drying costs by keeping your materials dry
- Lower moisture leads to increased production capacity
- Lower maintenance and fuel costs for loaders
- Lower paving costs

Impact of Stockpile Moisture

- Expect to Lose 12% Production Capacity for Every Percent Stockpile Moisture Above 2%
- Every 2% Underestimation of Stockpile Moisture Produces 0.1% Excess Asphalt Content

How to Reduce Moisture

- Paved stockpile area
- Sloped stockpile area
- Cover stockpiles

Benefits of Paved Stockpile

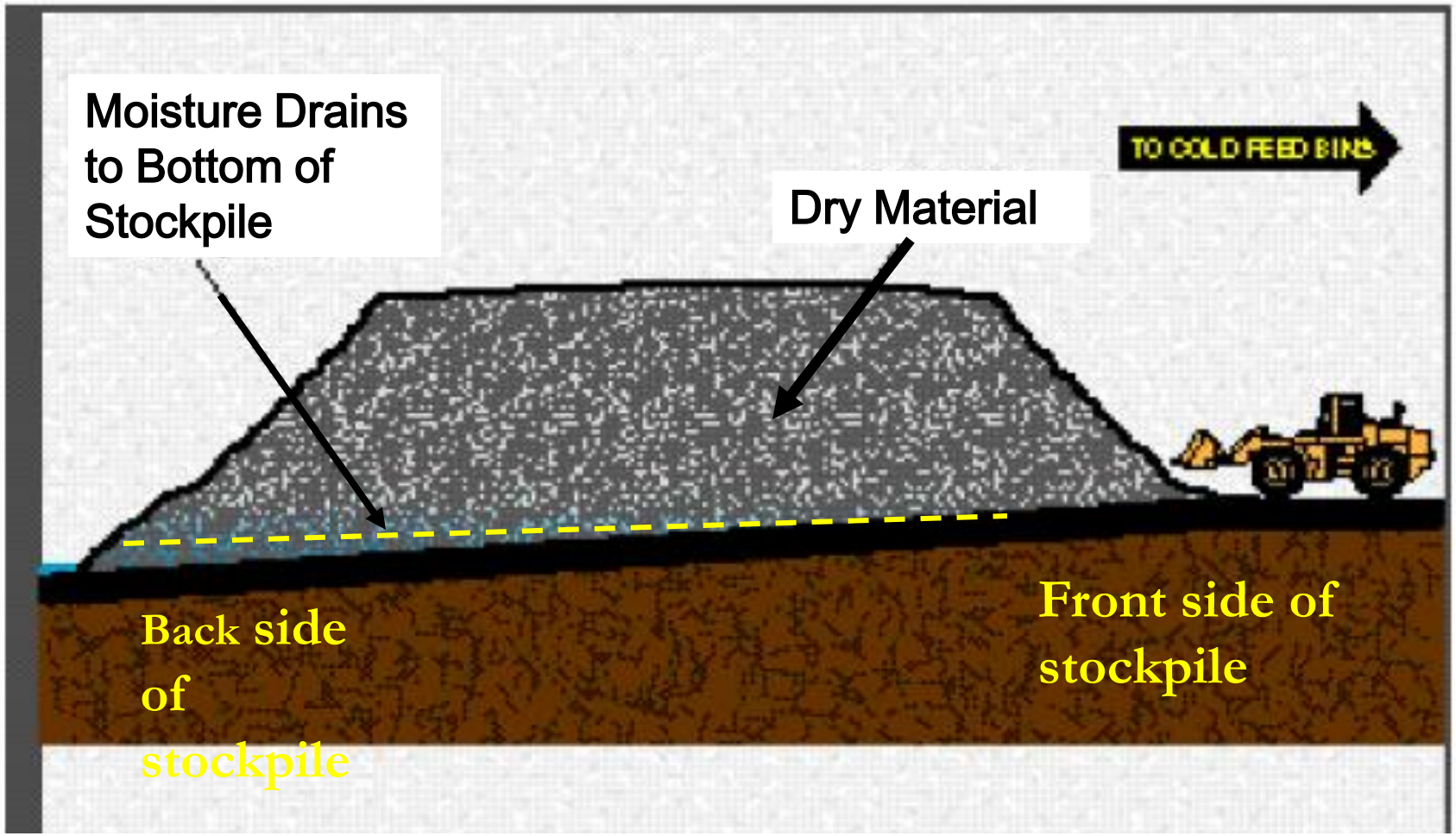
- Reduced contamination
- Reduced moisture

Benefits of Sloped Stockpile

- Moisture drains to bottom of pile
- On slope, moisture drains away

- Slope grade 3 to 4°
- Pick off high side of pile
- Face slope towards sun to more drying
- Can reduce moisture 2% overall

Stockpile With Ideal 4 Percent Slope



Covered Stockpiles

- Especially in high moisture areas


Mix Plant Operations

Plant Control

- Control plant inputs (cold feeds)
- Control material variability
- Follow-up QC/QA results
- Watch drum flighting – maintain protective RAP veil
- Avoid overheating mix
- Normal production care and attention

Summary of RAP Best Practices

- Process RAP and stockpile
- Fractionate RAP
- Avoid contamination
- Keep the RAP dry –paved and sloped area, covered stockpile
- Watch plant production

Thanks to:

- NAPA, AASHTO, FHWA, APAI sponsored workshop, *Materials and Energy Conservation in Hot Mix Asphalt*
  - Available on NAPA website
- Gerry Huber
- And to you!