Why?
From Here to There - The Right Way
Why Do We Need to Know About Stockpiling?

- Segregation
- Degradation
- Consistency
- Process control
- Contamination
- Loadout
- Affects on customers
Take - Aways

• Understand the problems of aggregate material contamination, segregation, and degradation

• Know what causes segregation

• Know various techniques to minimize stockpile problems
Glossary

• Separation
  – Keeping piles apart

• Contamination
  – Unwanted material

• Degradation
  – Breakdown after material has been stockpiled

• Segregation
  – Separation of material by particle size
Separation

- Prevent accidental mixing
- Space stockpiles
- Structures
  - walls
  - three-sided bins
  - covered, enclosed facility
Contamination

- Any foreign material
  - Aggregate
  - Dirt
  - Chemical
  - Dust
  - Spillage
  - Merging piles
Contamination

- Prevention
  - Eliminate bucket spills
  - Work floor debris
  - Clean your bucket / tracks / truck beds
Degradation

- Breakdown of material after it’s been stockpiled
  - Results in finer gradation
  - Exposes deleterious material
  - Caused from weathering, mechanical breakdown
Combating Degradation

- Know materials and crushing operations
- Inventory control – “just in time”
- Minimize traffic on stockpiles
- Recombine at loadout
Segregation – What is it?

- Separation of material by particle size
Segregation – Problems it causes

- Mix characteristics
- Control at aggregate & HMA plant
- Roadway
  - Structural integrity
  - Stripping potential
  - Raveling
  - Drainage
Segregation Principles

- Energy: \( F=ma \)
- Size and shape
- Distance
Newton’s 3 Laws of Motion

• An object at rest tends to stay at rest and an object in motion tends to stay in motion…

• $F = m \times a$

• "For every action, there is an equal and opposite reaction."
3 Real Laws of Motion

• Why did the chicken cross the road?
  – Chickens at rest tend to stay at rest. Chickens in motion tend to cross the road.
  – It was pushed on the road.
  – It was pushed on the road by another chicken, which went away from the road.
  – It was attracted to a chicken on the other side of the road.
Stacker Conveyor
Energy

- **Energy**
  - *potential* = stored
  - *kinetic* = moving

- **In aggregates**
  - *potential* = top of pile
  - *kinetic* = moving down or sideways

- **Conveyors**
Segregation

- Size and Mass
- Destroys blend
  - Settling
  - Erosion
  - Casting
Size and Shape

- Size ranges
  - Coarse
  - Midrange
  - Fine (sand)

- Texture
  - Smooth surface
  - Rough surface

- Shape
Segregation

- Size and Mass
- Destroys blend
- Settling
- Erosion
Casting Distance

- Casting segregates material
- Drop distances
- Stockpile shapes
Stockpiling Methods and Consistency

• Telescoping elevating stacker
• Radial stacker conveyor
• Stationary stacker conveyor
• Truck stockpiling
Stockpile Shapes

• Cone

• Trapezoid
  – Simple layer

• Windrow layer
Stacker Conveyors – Cone Stockpile

Radial Stacker

Stationary Stacker
Truck Stockpiling
Truck Stockpiling

Build in layers

Avoid dropping over edge
Telescoping Conveyor

- **Advantage**
  - Build stockpiles in layers to minimize segregation

- **Disadvantages**
  - Cost
  - Real Estate
Distance = Segregation

• Distance from
  – truck to ground
  – conveyor to pile
  – bucket to truck

• Keep your
  – conveyor low
  – bucket low
  – dump slow

Large
Medium
Small
Know Stockpile Construction

- **Conical**
  - most re-blending
- **Layered**
  - some re-blending
- **Windrow lifts**
  - least re-blending
Stacker Conveyor
Combating Segregation

• Box at head pulley
Combating Segregation

• Modified pulley
Combating Segregation

- Modified Pulley With Head Box
Combating Segregation

• Loader Catching Sample From Under Wheel
Combating Segregation

Prior to Modified Pulley

After Modified Pulley
Combating Segregation

- Critical link is the loader operator
- Loadout procedures
Loader Techniques

• Know stockpile construction

• Loading point

• Working the face
Working the Face?
Loading Point

- Load from end
- Re-blend
- Approach straight
Entering the Face

- Work upward
  - Leave bottom 6-12”
  - Wet
  - Contamination
- Split the seams
  - rotate up
  - back out
Working the Face

- Move across face
  - Perpendicular to conveyor
  - Less segregation
  - Better mix
    - Fine
    - Medium
    - Coarse

- Avoid deep penetration
So Far…

- Separation
- Contamination
- Degradation
- Segregation
How many faces do you see?
Stockpile “Do’s”

• Adequate room to build your stockpile
• Everyone involved in building, managing, and shipping material knows proper procedures
• Consider factors in constructing stockpile
  – Weather, size, length of storage, accessibility, material type, market
• Frequently inspect stockpiles
• Loadout perpendicular to conveyor
• Test belt samples and stockpile samples
• Plan ahead
Stockpiling “Don’ts”

- Don’t let stockpiles come in contact
- Don’t assume a stockpile will “take care of itself”
- Don’t add material with contaminated bucket or truck
- Don’t scrape ground when loading out
- Don’t cover up contaminated material with good product
- Don’t stop “preaching” good practices
Don’t be afraid to ask…

What would you like to know?