

***High Float Emulsions  
The Low Cost Chipseal Alternative***

***What, Why, How***

# *Asphalt emulsions consist of...*

- *Asphalt*
- *Water*
- *Chemical emulsifying agents*
  - *keep AC suspended in water*
    - *Cutbacks like MC's dilute the AC in Fuel*

# *Chemical emulsifying agents*

- *Usually have no effect on cured AC*
- *Exception - high float agents*
  - *form networked gel structure*

# *High Float Agents*

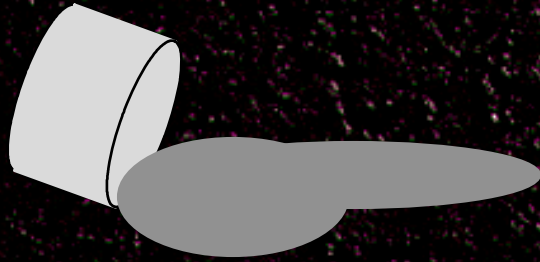
- *Are called “tall oils”*
  - *derived from pine trees*
- *Form gel structure similar to “Jello” in AC residue*

# *What does this gel structure do?*

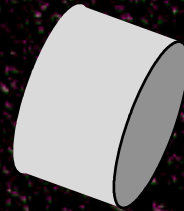
- *Prevents flowing at high temperatures and low shear rates*
- *Is less temperature-susceptible than the base AC*
- *Allows thicker films of asphalt on aggregates*
- *Allows the use of softer AC's, which aren't as brittle at low temps.*

# *What does this gel structure do?*

- *Doesn't flow at pavement surface temperatures*
- *That's why they tend to bleed less than other un-modified emulsions / cutbacks*



**Emulsion Grade AC**



**High Float Residue**

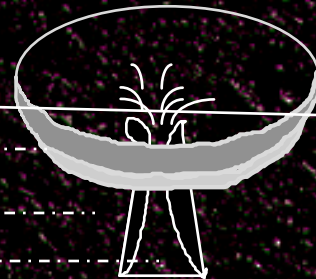
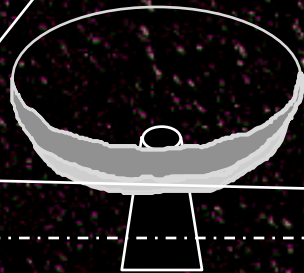
# *Advantages When used as a Chipseal Alternative*

- *Asphalt doesn't bleed at high temps.*
- *Use of softer base AC's*
  - *less brittleness at low temps.*
  - *less shelling of aggregates*

# What does “High Float” mean?

- *EM Residue passes the “float” test ASTM D139; AASHTO T-50*
- *Soften or melt the residue in warm water*
- *The longer it takes, the less susceptible the asphalt is to temperature.*

**Pass**



**Fail**



# *Typical High Float Emulsions for chipseals*

- *HFMS-2 High Float Medium Set*
  - *Similar to HF-150*
- *HF-90 High Float (90 Pen)*
  - *Little Stiffer for warmer climates*
- *HF-150 High Float (150 Pen) Most commonly used HF chipseal emulsion in Eastern Washington*
  - *Reference HF-150 for balance of talk*

# ***High Float 150***

## ***Different than CRS-2P and Cat's?***

- ***Slower setting than Cationic emulsions***
  - ***Will allow traffic to seat rock in cooler climates and over longer periods than Cat's***
- ***Easier to handle***
  - ***More stable than Cat's***
- ***More forgiving***
  - ***Emulsion can be left open longer than Cat's***
  - ***Works with dirtier aggregate and will still grab the stone***
- ***Crushed Cover stone is generally the preferred aggregate.***

# ***High Float 150 Different than MC's***

- ***Use at much cooler temperatures.***
  - ***HF -150 used around 130 to 175 degree***
- ***Will firm up much quicker –relies on water evap vs. Kerosene evap.***
  - ***Hold rock firmer***
- ***Much less likely to bleed***
  - ***Due to the gelling of the asphalt residue***

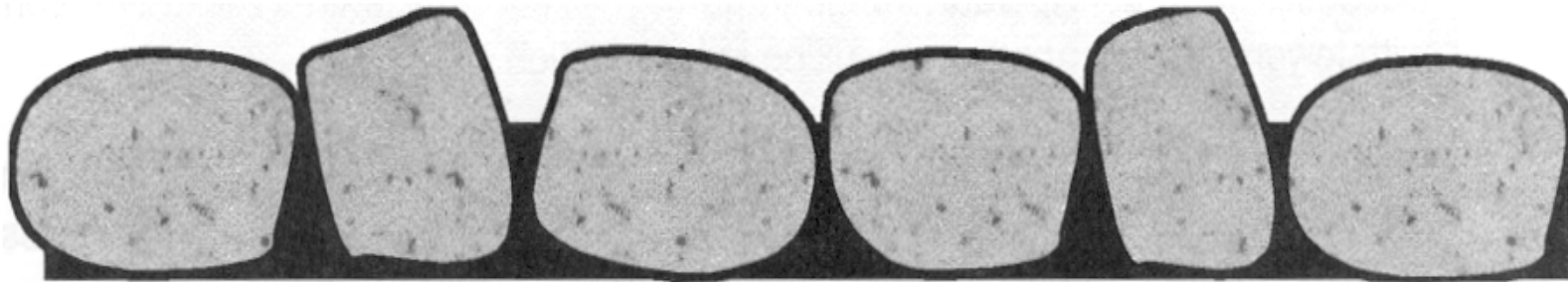
# WSDOT “crushed Cover Stone” 9-03.4(2)

- $\frac{3}{4}$ ” square 100 % passing
- $\frac{5}{8}$ ” square 95-100
- U.S. No. 4 20-45
- U.S. No. 200 0-7.5
- % fracture by wt., min. 75
- Sand Equivalent min. 40
- Static Stripping test Pass
- Much dirtier than chips used with cationic emulsions
- Cats generally require less than 2% passing No. 200
- Usually much lower cost and more available than clean chips **Saves \$**

# *Known as the Otta seal in Scandinavian Countries*

- *Different Structure; dense hotmix like structure vs. single chip layer glued down.*
  - *Less emulsion needed for dense structure **Saves \$***
    - *Rock Structure adds to the seal strength / reliability*
- *Highly reliable*
  - *Low failure rate*
  - *Handles cold weather*
  - *Easy to use*
- *Scandinavian's have studded tires and feel it holds up well.*
- ***Also used in: Alaska, Canada very successfully***

# *Standard chipseal*



- *One layer thick*
- *Asphalt Residue glues the chips down*
- *CRS-2P needs clean chip to adhere to due to fast break*
  - *Major cause of Seal failure is dirty chip*
- *Need enough Glue to hold the chip*
  - *Major cause of seal failure is not enough glue.*

# *Otta Seal*



- ***Matrix of rock like hotmix***
  - ***Rocks interlock for strength***
  - ***Asphalt Residue fills small voids and surrounds rocks like in hotmix***
  - ***Strength comes from interlock & glue***
    - ***Adds to reliability***



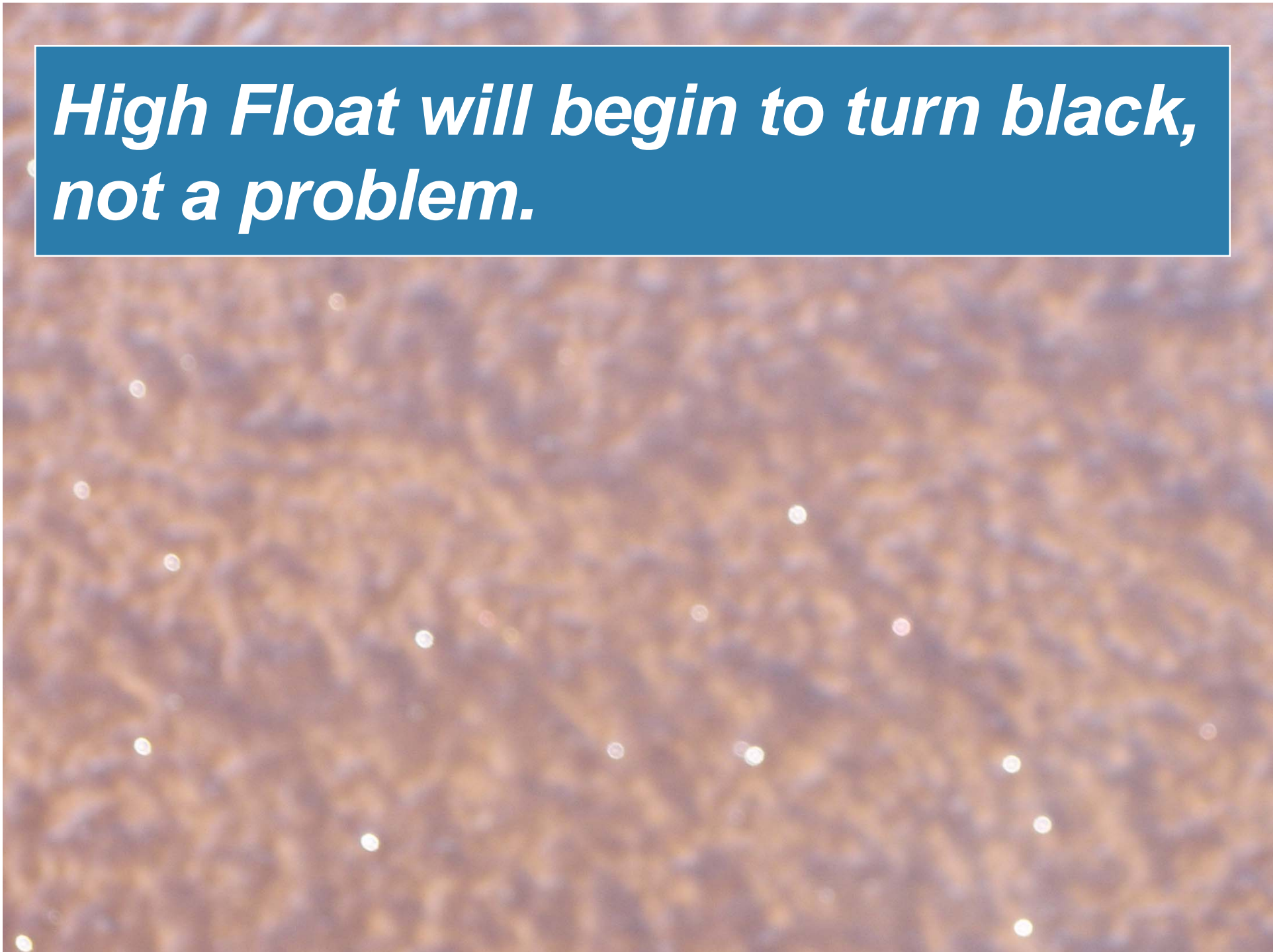
***WSDOT Crushed Cover Stone***



- *Prep just like any other chipseal. Apply approx. .40 to .46 Gal / yd<sup>2</sup> (Much less emulsion than required CRS-2P for comparable seal and traffic conditions when using Crushed Cover Stone.) Does not need to be covered immediately unlike cationics.*



***High Float will begin to turn black,  
not a problem.***



***Note the distance of chip spreader behind fresh emulsion. This should not be done with Cationics.***



***Apply 30 to 35 lbs. of Aggregate. Small aggregate will drop first, but High Float 150 will allow time for rolling and traffic to push larger stone into the seal.***



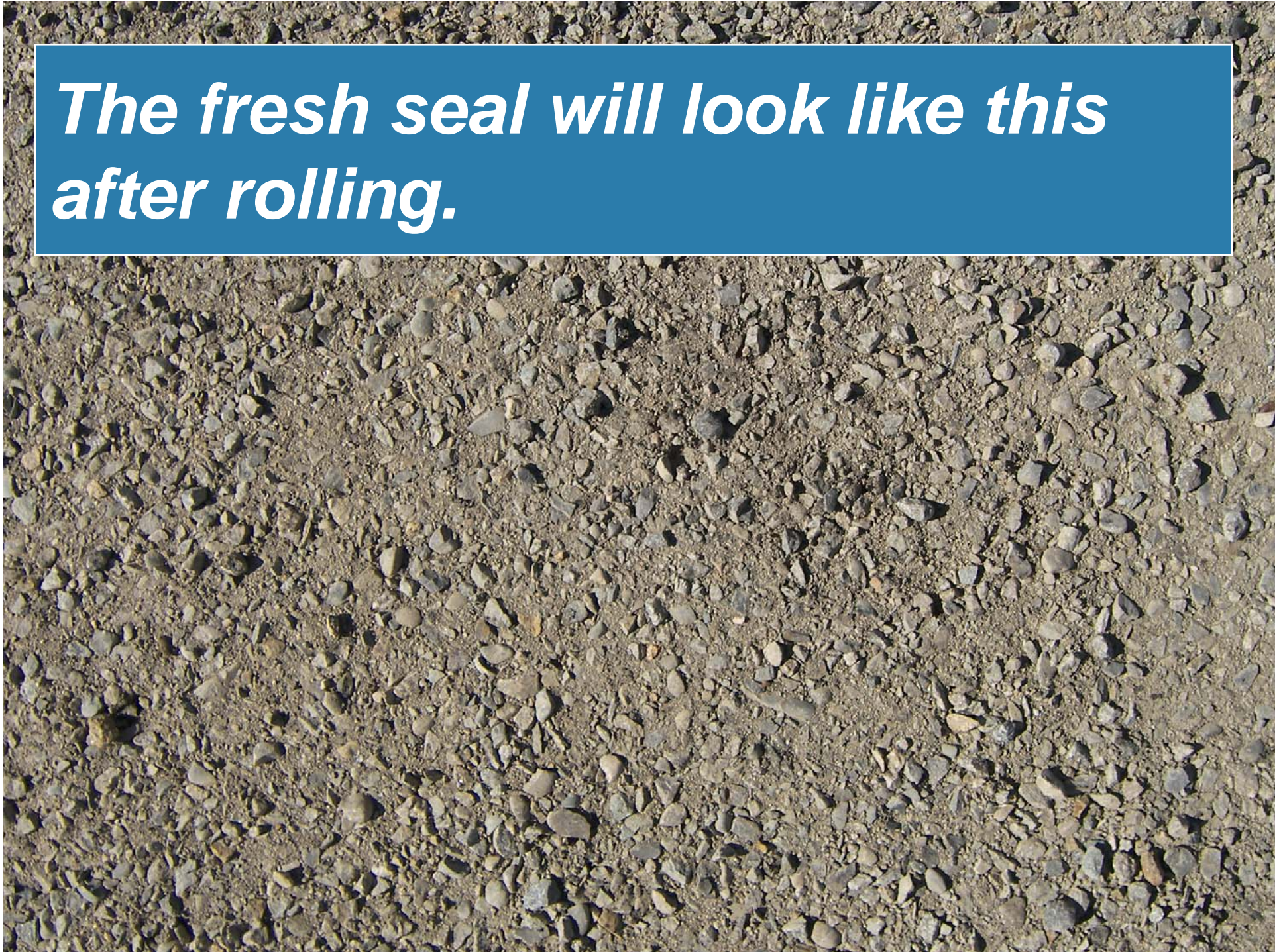
*Roll normally*





*Stagger your trucks, they do a great job of seating aggregate.*

*The fresh seal will look like this  
after rolling.*



*Traffic will seat the large stone*





## *2011 learning on Higher Traffic use*

- *Otta Seals creat a matrix much like hotmix*
  - *Treat them like hotmix*
  - *Higher traffic designs need to be compacted more*
- *Higher traffic = more compaction, less room for asphalt residue. ( Just like Hotmix)*

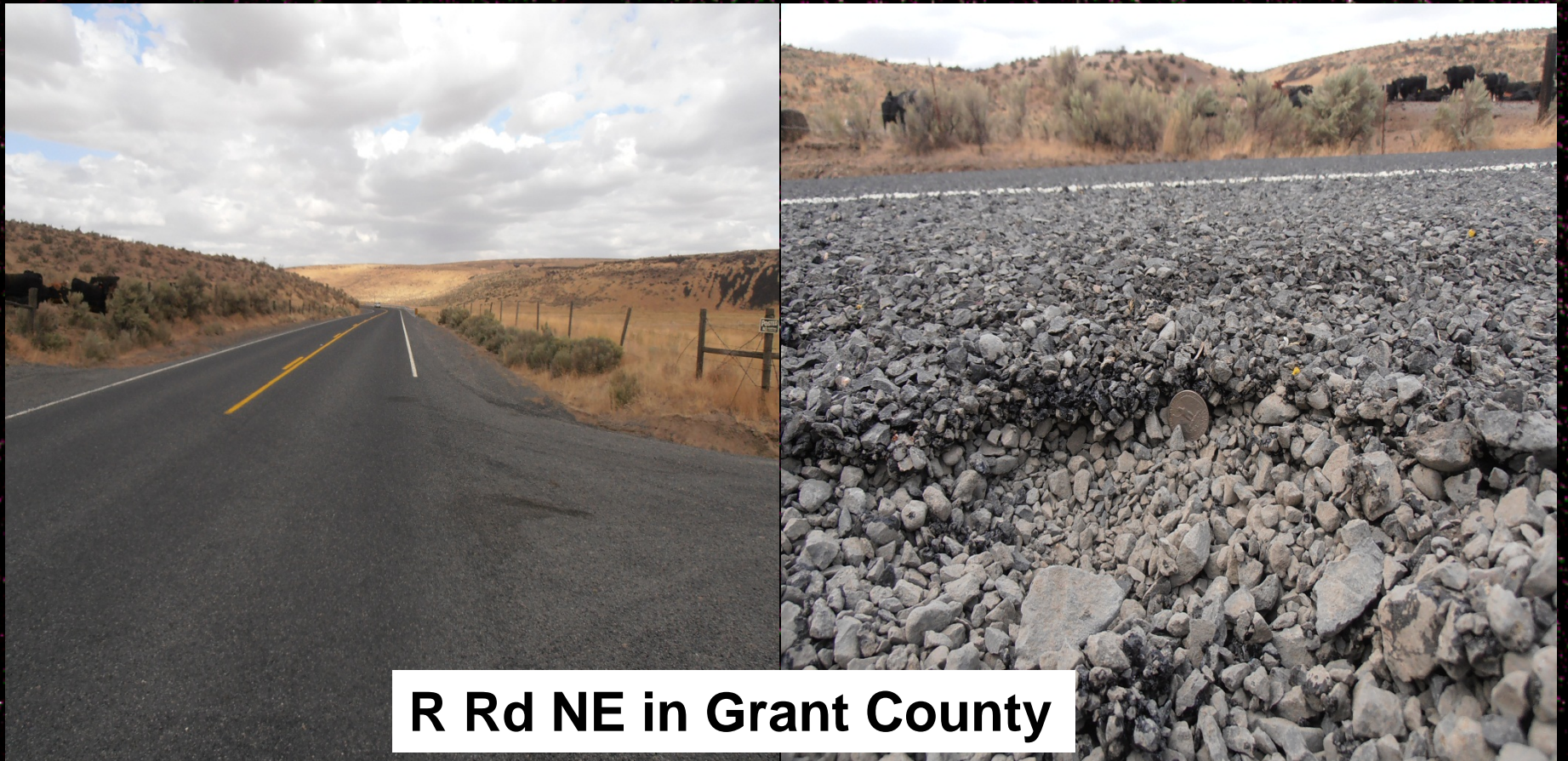
## ***2011 learning on Higher Traffic use***

- ***Need to increase compaction while the emulsion is still wet and can grab loose rock.***
  - ***Increased rolling effort means more compaction early, grabs rock before it can sluff off.***
    - ***Increases thickness of seal (holding more rock) at equivalent emulsion rate.***
- ***Otherwise traffic will compact later and force residue to the surface as the rock pushed into voids.***

***The final product***



# *Using High floats to build a BST road*



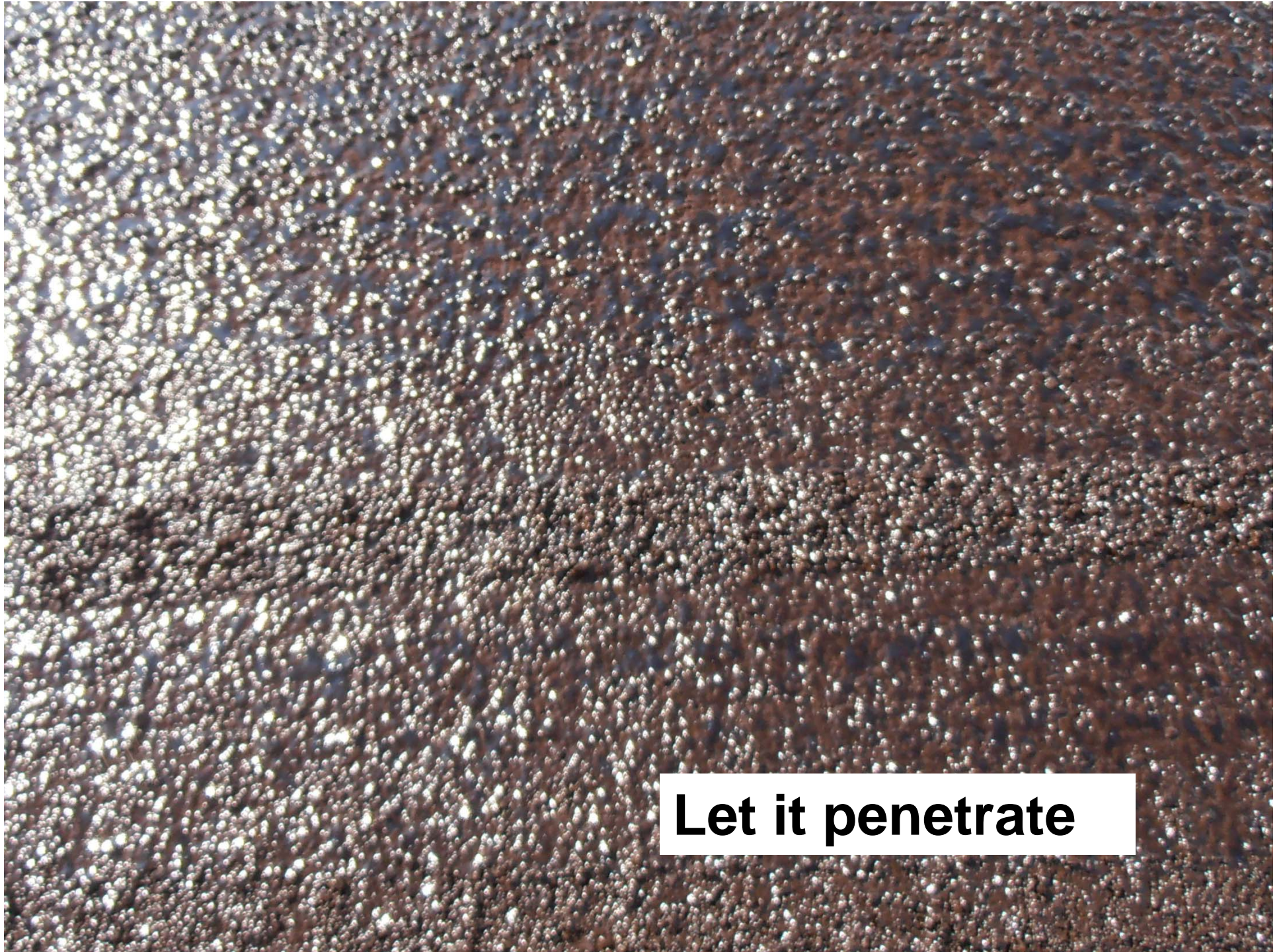
**R Rd NE in Grant County**

# *Spokane County Road*





- 1. Fluff the surface**
- 2. Dampen**
- 3. Apply HF-150 @ .5 to .6 Gal/yd<sup>2</sup>**



**Let it penetrate**



**Apply crushed cover stone**





**Roll with steel roller**

## *Building a BST Road with HF*

*Give the first seal a few days to cure*

- *Sweep*
- *Seal again with .4 to .44 gal/yd<sup>2</sup> of HF*
- *Cover with 30 lbs of crushed cover stone*
- *Roll, roll, roll,*
- *Sweep*

# *The Final Product*

- **Strong**
- **Thick**
- **Dense**

## *In summary*

- *Otta Seals save money (15 to 25% less Expensive)*
  - *Less emulsion and much lower cost rock) vs. CRS-2P and Clean chip.*
- *With graded aggregate, don't need clean chips*
- *If your working in conditions not conducive to Cationic seals*
  - *Slow production crews*
  - *Cooler weather, late season*
  - *Over granular bases - penetration*
  - *Low traffic that won't be enough to seat rock soon.*
    - *CRS-2P requires enough traffic to seat rock well before winter weather. Very sensitive!!!*

# *The Final Word – I promise!!*

- *Roll, Roll, Roll*
- *Try a steel roller in your production train*
  - *IT will bring down the high points that get hit by snow plows*
  - *Great compactive effort*
  - *Seals look best their second year only because that year of traffic finally gave them the compaction they needed*
- *Do it right away and minimize the chance of Seal failure.*