

#### Asphalt comes from Crude Oil

 Crude Oil was formed millions of years ago by the bacterial decomposition of organic matter, both plant and animal, buried under heavy layers of our earth's sediment.

#### Asphalt

- A high molecular weight thermoplastic hydrocarbon found in crude petroleum oils.
- The "best glue in the world"



#### **Fractional Distillation**

- Propane
- Butane
- Gasoline
- Naphtha
- Kerosene
- Diesel
- Gas Oils
- Asphalt

#### Asphalt Cements- AC

- PG58-28
- PG64-22
- PG52-34

Modified AC's Polymer

- PG58-34
- PG64-28
- PG64-34
- PG70-28
- PG 76-28

#### Emulsions in the Region

- •CRS-2
- •CRS-2P
- •CSS-1H
- CSS-1HM (micro surfacing)
- High Floats (HFE's, AE's)

#### Cutback Asphalts in the Region

- MC70
- MC250
- MC800, MC800R
- MC3000, MC3000R
- RC70
- RC800, RC800R

#### Asphalt Surface Treatment Applications

- Chip seal
- Fog seal
- Cape seal
- Micro surfacing
- Scrub seal
- Tack coat
- Thin overlay
- Bonded wearing
- course











#### Chip Seals

- Millions of Sq. yards per year in South Dakota
- Why do we do that?
- Chip Seals seal out the water
- Create skid resistance
- Fill small cracks, and voids in pavements
- Chip seals largely control black ice
- Extend the life of the pavement
- Economical













### Chip Seal Aggregates

- One-sized, angular- 90% of aggregate should have at least two fractured faces
- Cubical- shaped, like your fist
- Clean- 0-1% passing the 200 sieve
- Angular- not flat, 17% max on flakiness
- Hard- 30% max on LA wear test

#### Aggregate Materials

- Clean
- Durable
- Crushed
  - -two or more crushed faces
- Single Sized
- Cubicle





































#### Tons of Material Per Mile

- Emulsion
- .35 gals. sq. yd. = 4928 gals. or 21 tons
- .40 gals. sq. yd. = 5632 gals. or 24 tons
- 25 lbs. sq. yd.

• 20 lbs. sq. yd.

= 140 tons

- = 176 tons

• Chips

# Fog Seals

- Why?
- Cheap insurance for the Chip Seal
- Good public perception
- Pavement markings show up well
- Easy, fast to construct
- Utilizes equipment well

# Fog Seals







#### Fog Seal

- Gallons per sq. yard of CSS-1H 1:1 Dilute
- •1 Mile x 24' = 14,080 sq. yards
- .10 gal. sq. yd. = 1,408 gallons
- .15 gal. sq. yd. = 2,112 gallons



























#### Tack Coat

- Why? Layer Bonding!
- Surface Preparation Clean and Dry
- Milling Improves Field Performance
- Too much tack is bad
- Typically CSS-1H 1:1 dilute
- 0.10 to 0.20 Gal/SY when applied to existing or milled surfaces
- 0.05 to 0.10 Gal/SY applied to freshly laid asphaltic concrete







#### Scrub Seal

- Useful to seal cracks and protect the wearing surface.
- Requires special equipment to "scrub" the emulsion and cover aggregate into the cracks and surface voids.
- The emulsion may contain polymers or rejuvenating oils.
- 0.15 to 0.40 gal/yd<sup>2</sup> of emulsion and 10 to 20 lbs/yd<sup>2</sup> of sand or fine aggregate.













## Thin Overlay

- Road should be in good condition
- Improves profile, ride quality
- Uses traditional hot-mix asphalt paving equipment to construct
- <sup>3</sup>⁄<sub>4</sub>" to 1 <sup>1</sup>⁄<sub>2</sub>" thickness depending on gradation
- Polymer modified binder can be used to enhance the durability of the mix











### Milling and Micro Milling

- Restore the longitudinal and transverse profile of the road.
- Remove defects prior to an overlay or surface treatment.
- Milled material can be recycled into new overlays or used in other asphalt applications.









