Fate, Behavior, & Modeling of Spilled Asphalt

Response to Liquid Asphalt Releases in Aquatic Environments

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Five Spill Response Questions:

- What got Spilled?
- Where will it go?
- Who gets hurt?
- How does it hurt?
- What can we do?
Where Will It Go?

- **Components:**
  - Release
  - Physical Transport
  - Weathering
Release:

- **Usually shipped heated**
- **Size of the hole**
- **Location of the hole**
- **Viscosity of product**
- **Density of product**
- **How fast/slow will it cool**
  - Reach pour point?
- **Will the hole self-seal**
- **Influence size of blobs.**
Weathering:

- **Evaporation (outgassing)** -- what does it give off, does that affect density, properties (it sure can smell...)
- **Dissolution** -- any toxic compound likely to dissolve into water column?
- **What if it is cut with something?**
- **Long term weathering** -- not much, It does survive on roofs and roads!
- **Dispersion** – not likely
- **Long-term:**
  - Photo-oxidation
  - Bio-degradation
- **Not much surface exposure.**
Transport:

- **Key Factor: Does it Float?**
- **Initial Specific Gravity**
- **Changes:**
  - **M-53:** Saw Asphalt initially float, then sink in fresh water: Why?
    - **As it cools? How fast?**
    - **Sedimentation:**
      - It doesn’t take much to make it heavy enough to sink.
      - Dish shape?
Transport:

- **What size pieces does it break up into?**
  - Tarballs?
  - Big blobs?
  - Patties?

- **Significance:**
  - Cooling speed
  - Transport
  - Clean-up
  - Observation
If it floats:

- **Similar to a traditional oil spill:**
  - *At least for well weathered tarballs…*

- **Major Factors:**
  - Wind (windage will be small – <1%)
  - Currents
  - Turbulent dispersion
Sedimentation:

- **How sticky is it?**
- **What is the source of sediment?**
  - *River bottom*
  - *Beach: “Tootsie rolls”*
  - *Suspended sediments*
- **How big are the blobs?**
  - *Picking up rocks on the beach, or…*
  - *“Boat Ramp”*
If it sinks:

- *Moves like bed load:*
  - *Well established literature for traditional sediments*
  - *Beaches and Rivers*
  - *Maybe suspended load?*
Shields Number: \( \theta = \frac{\tau_0}{(S_s - 1) \rho g d} \)

- Ratio of Bed Shear Stress to buoyancy
- Need to know: particle size and specific gravity.
Some Pretty Big Pieces can move!
Discussion